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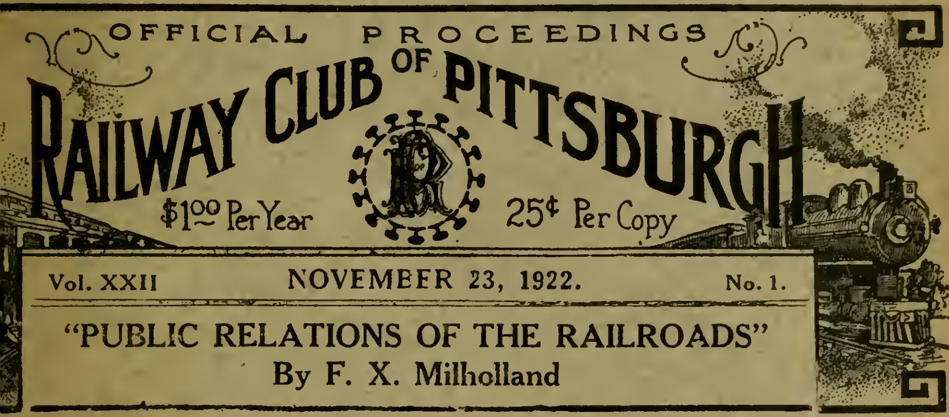

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Vol. XXII — NOVEMBER 23, 1922. — No. 1.

"PUBLIC RELATIONS OF THE RAILROADS"

By F. X. Milholland

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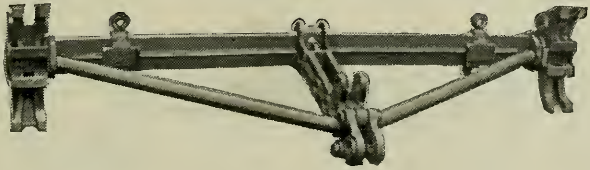

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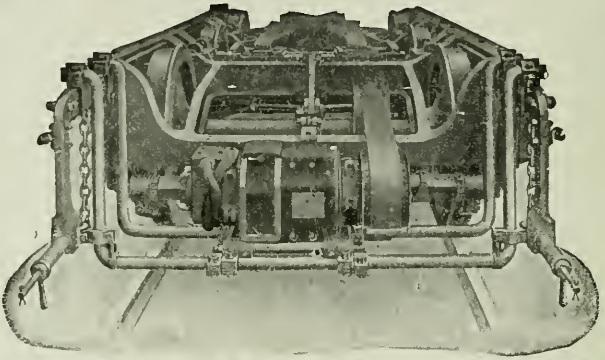

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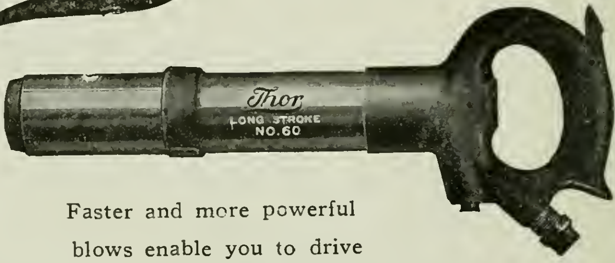

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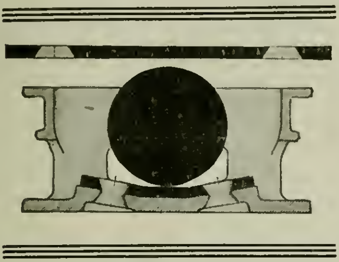

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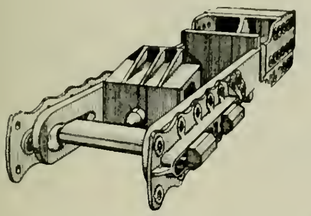

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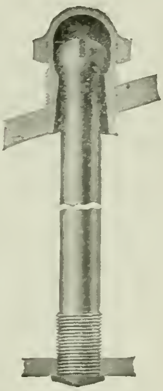

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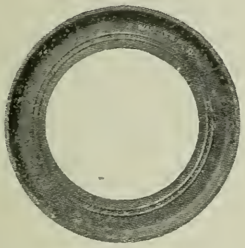

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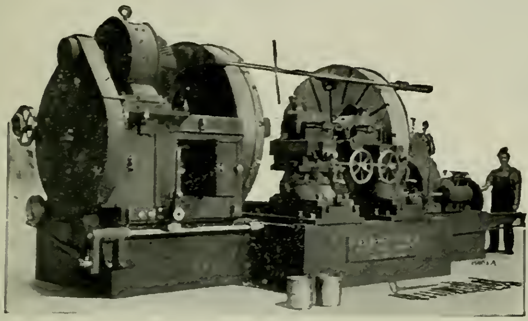

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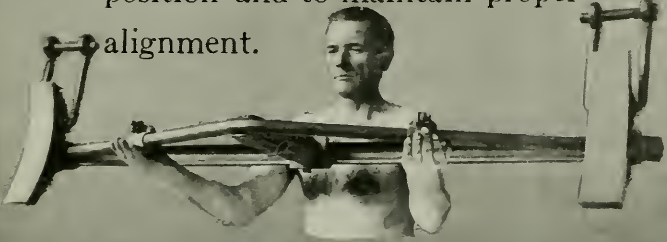

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OF
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Organized October 18, 1901.

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No. 1

Pittsburgh, Pa., Nov. 23, 1922

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*J. H. McCONNELL	October, 1901, to October, 1903
L. H. TURNER	November, 1903, to October, 1905
F. H. STARK	November, 1905, to October, 1907
*H. W. WATTS	November, 1907, to April, 1908
D. J. REDDING	November, 1908, to October, 1910
F. R. McFEATTERS	November, 1910, to October, 1912
A. G. MITCHELL	November, 1912, to October, 1914
F. M. McNULTY	November, 1914, to October, 1916
J. G. CODE	November, 1916, to October, 1917
D. M. HOWE	November, 1917, to October, 1918
J. A. SPIELMAN	November, 1918, to October, 1919
H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921

*—Deceased.

Meetings held fourth Thursday of each month except June, July and August

PROCEEDINGS OF MEETING
NOVEMBER 23, 1922

The meeting was called to order in the English Room, Fort Pitt Hotel, Pittsburgh, Pa., at 8 o'clock p. m., President D. F. Crawford in the chair.

The following gentlemen registered:

MEMBERS.

Anderson, A. E.
Babcock, F. H.
Bartholomew, W. S.
Berg, Karl
Berghane, A. L.
Blakely, W. W.
Bradley, W. C.
Carbis, N. J.
Carlsson, John
Carter, John D.
Chalker, A. R.
Chilcoat, H. E.
Christy, F. X.
Clark, Chas. H.
Clark, Harvey
Coulter, A. F.
Crawford, D. F.
Cunningham, R. I.
Daley, John
Dambach, C. O.
Davison, C. R.
Down, S. G.
Emery E.
Fendner, W. J.
Fink, P. J.
Forrest, C. H.
Fults, J. H.
Glenn, J. H.
Gordon, J.
Greene, W. F.
Gross, Chas.
Guay, John W.
Hale, Chas. E.
Harger, M. L.
Hazlett, H. H.
Heckmon, C. J.
Hershey, O. W.
Holmes, E. H.
Howe, C. A.
Howe, D. M.
Hudson, W. L.
Hussong, Albert C.
Jones, E. A.
Kasnitz, J. J.
Kelly, H. B.
Kelly, L. J.
Kempf, G. P.
King, J. W., Jr.
Kroske, J. F.
Kummer, Jos. H.
Lake, Albert H., Jr.
Lanahan, J. S.
Laurent, G. F.
Lent, John F.
Lobez, P. L.
Lower, N. M.
Lynn, Samuel
Masterann, Joseph
Matchett, H. K.
Millar, C. W.
Miser, C. H.
Moir, W. B.
Moore, D. O.
Moran, J. V.
Myers, W. H.
McConnell, P. L.
McNulty, F. M.
Noble, Jesse A.
Osbourne, A. S.
Painter, Joseph

Patmor, H. F.
Peirce, E. C.
Rabold, W. E.
Ralston, J. A.
Rauschart, E. A.
Redding, D. J.
Rhoads, G. A.
Schrecongost, C. D.
Sewell, H. B.
Smith, F. M.
Spielmann, J. A.
Ternent, H. J.
Thiele, Chas. F.
Walker, J. W.
Walter, W. A.
Walther, G. C.
Widmeier, L.
Williams, R. W.
Winell, K. O.
Woodburn, C. D.
Wright, John B.
Zilian, R.

VISITORS.

Abel, A. W.
Burtoft, Wm. E.
Coll, A.
Culver, C. H.
Cunningham, N. P.
Fults, J. J.
Gruber, J. W.
Gunnison, W. L.
Jex, W. T.
Kramer, H. W.
Lambiose, Herman
Mahan, W. C.
Milholland, F. X.
Miller, John
Orme, J. L.
Robbins, A. V.
Smith, Sion B.
Stenson, G. A.
Thomas, C. V.
Thomas, J. J.
Warrensford, F. S.
Yearich, R. D.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with, as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Abel, A. W., Stationery Storekeeper, Penna. System, Central and South Western Regions, 7722 Brashear St., Pittsburgh, Pa. Recommended by A. F. Coulter.

Gibson, O. P., Wrecking Craneman, P. & L. E. R. R., 120 E. Schoonmaker Ave., Monessen, Pa. Recommended by S. A. Damore.

Giles, D. J., Rep., Wilson Imperial Co., 115 Chestnut St., Newark, N. J. Recommended by J. L. Cunningham.

Guignon, W. E., Div. Engr., Penna. System, Federal Street

Station, N. S., Pittsburgh, Pa. Recommended by D. M. Howe.

Hale, Otis R., Dist. Sales Mgr., American Locomotive Co., 30 Church St., New York City. Recommended by E. A. Rauschart.

Hughes, Wm., Draftsman, Pressed Steel Car Co., 16 Eloise St., N. S., Pittsburgh, Pa. Recommended by R. S. Ramsey.

Hush, Geo., Jr., Salesman, Manning, Maxwell & Moore, Inc., 1005 Park Bldg., Pittsburgh, Pa. Recommended by A. F. Coulter.

Lilley, C. S., Cashier, Penna. System, 111 Maple Ave., Edgewood, Pittsburgh, Pa. Recommended by F. H. Park.

Miller, John, Gen. Car Fore., Montour R. R., 5127 Blair St., Hazelwood, Pa. Recommended by E. A. Rauschart.

Moreland, Evan L., Mach. Shop Fore., Montour R. R., 1215 Hiland Ave., Coraopolis, Pa. Recommended by E. A. Rauschart.

Provost, S. W., C. C., American Locomotive Co., N. S., Pittsburgh, Pa. Recommended by E. A. Rauschart.

Reynolds, Frank H., Rep., American Locomotive Co., 30 Church St., New York. Recommended by E. A. Rauschart.

Salisbury, William, Trav. Car Insp'r., P. & L. E. R. R., Newell, Pa., Fayette County. Recommended by F. G. Minnick

Shaffer, Glenn A., Record Clerk, P. & L. E. R. R., 2611 Wilson Ave., E. Youngstown, Ohio. Recommended by A. Sykes.

Sowash, Fred E., Storekeeper, P. & L. E. R. R., 26 N. Beaver St., New Castle, Pa. Recommended by A. Sykes.

Stenson, Geo. A., Mech. Expert, Westinghouse Air Brake Co., Wilmerding, Pa. Recommended by R. W. Williams.

Thomas, J. J., Asst. Supt., Fort Pitt Spring & Mfg. Co., Box 917, Pittsburgh, Pa. Recommended by John Daley.

PRESIDENT: As soon as these applications have been approved by the Executive Committee the gentlemen will become members upon payment of the year's dues.

There being no further business, Mr. F. X. Milholland, Assistant to Senior Vice-President of the Baltimore and Ohio Railroad Company, Baltimore, Md., presented the paper of the evening, entitled:

"PUBLIC RELATIONS OF THE RAILROADS"

By F. X. Milholland

It is more than idle words when I say that I am pleased to be present at your meeting tonight and that I consider it a great honor to address you. This is usually the gracious way to open one's remarks; but I want to say sincerely that the opportunity to meet so many of the citizens of Pittsburgh is greatly appreciated. The very cordial welcome you have accorded me is most assuring.

It seems proper at the outset that I should make an explanation of how I happened to be so honored. Some three weeks ago I received a telegram from Mr. Robert S. Binkerd, Assistant to Chairman of the Association of Railway Executives at New York, saying he had been requested to furnish a speaker for this occasion and asking me if I would consent to make an address on some phase of the railroad question. At first I was inclined to ask to be excused because I felt myself so inadequate to the task and knew that there were many other railroad officers qualified to discuss on an occasion like this, so much better than I could ever hope to do, a subject so extensive and important. The way in which the invitation was extended, however, and the latitude given for the selection of the phase to be discussed, left me no alternative. I consented, therefore, to accept the grat responsibility in the sense of duty which I felt rested upon me to contribute, even in a small way, towards helping to a better understanding, if possible, of the general railroad problem, which, to my mind, is one of the most important questions now before the public.

The Association of Railway Executives, as its name implies, is composed of those gentlemen who are managing the greater portion of the railroads of the country and was formed some years ago for the purpose of affording a common ground on which could be considered general matters of vital importance to the railroads as a whole, looking to their solution for the benefit, not only of the carriers, but the public at large. A melting pot, as it were, for the general good. The considerations of that Association are on the broadest lines of public interest.

I am not here as a representative of the Baltimore and Ohio Railroad Company as such, but only in so far as that Company is of necessity considered in connection with the railroads of the country. I wish to say, however, that because of my connection with that Company for a number of years—having been with no other, in fact I started my business career with it nearly 23 years ago—what I might say is naturally based chiefly upon my experience with that Company and study of the conditions obtaining on that property. During that time, however, it has been my privilege to have opportunity to observe generally railroad conditions throughout the country, particularly in the East. I think from a broad viewpoint, however, the situation on the Baltimore and Ohio is perhaps typical of the railroads at large, if not in all respects, at least from the public relations standpoint.

This suggests, then, the particular phase of the many great problems involved in the railroad question which I desire to consider with you for a few minutes tonight—the Public Relations of the Railroads.

As in every question, there are always two sides, so with this one about the relations of the railroads to the public, there is also the other side, the relations of the public to the railroads. They are concurrent, with equal responsibility. The one is just as important of solution as the other if we are to have a prosperous country.

It seems proper that we should first have a clear understanding of what the railroads are and what part they play in the general welfare before we can properly consider their public relations and the reciprocal relationship of the public. With this in mind it is appropriate, I think, and will perhaps be interesting, to briefly recount the establishment of the railroad and its growth to the present day. While history tells us there was a kind of railways in the form of tramways, used in England for carrying coal, as far back as the Sixteenth Century, such railways were not as we know them now, and therefore I will start with the beginning of the railroads in this country.

The Baltimore and Ohio Railroad was the first railroad in the United States designed to do a general freight and passenger business. That Company was born in the City of Baltimore February 12th, 1827, when a group of some 25 prominent and enterprising citizens met at the residence of Mr. Philip E. Thomas and decided to build a railroad to restore to the City of Baltimore its western traffic which had been diverted by transportation facilities offered by northern canals. The Charter from the State of Maryland was granted February 28, 1827. The Company was formally organized on April 24th following, and on July 4th, 1828, in the presence of a large number of enthusiastic spectators the Venerable Charles Carroll, of Carrollton, the last surviving signer of the Declaration of Independence, who was then over 90 years of age, laid the cornerstone, which marked the beginning of the enterprise, on which occasion he gave expression to those memorable words: "I consider this among the most important acts of my life, second only to my signing the Declaration of Independence, if even it be second to that." Two years later, or May 24th, 1830, the line was opened from Baltimore to Ellicott's Mills, Maryland, a distance of 14 miles. Many difficulties—physical and financial—were encountered in the early days, but the rails were finally extended to the City of Wheeling, on the Ohio River, its original objective point, December 24th, 1852, and the first train reached Wheeling January 1st, 1853. Then it was that the Baltimore and Ohio Railroad was true to form as expressed in its name, by connecting the City of *Baltimore* with the *Ohio* River. Subsequently, the railroad was extended throughout West Virginia and Western Pennsylvania, reaching your own City of Pittsburgh in June, 1871. Of course, other lines had reached here before that time. Later on lines were built to Chicago and St. Louis and in various other lateral directions, until today the Baltimore and Ohio System comprises 5,400 miles of line, and fast approaching 100 years of age, which will mark the

Centennial of railroad existence in this Country. We have had under consideration for some time the question of appropriate celebration in 1927. The Company will probably have some suggestions to make later on in this regard.

After the Baltimore and Ohio had gotten well under way with its construction and development, other railroads were started throughout the Country, until today, as you know, we have the great system of tracks, made up of many individual companies, comprising approximately 265,000 miles of line reaching across the length and breadth of the land.

The railroads and the Country developed concurrently. Were it not for the railroads the Country would not be what it is today. The growth of the steam railroad has been constant and it has gradually reached the present status through a long period of development and adjustment. Because of the very nature of the business of the railroads they are the public's strongest ally. The railroad is not a manufacturer or a merchant in the same sense as we ordinarily consider those terms. All it has to sell is "transportation' of freight and passengers', called in railroad parlance, as you know, ton miles and passenger miles. Without the public there would be no need of the railroads, and without the railroads in a Country such as ours, with its great expanse of land and apparently inexhaustable resources, there would, no doubt, be a vastly different public. Of course, at the present day of wonders, the automobile and the airship might meet certain needs, and do in many respects things that the railroads formerly did and are still called upon to do, but I do not think these new modes of transportation, which are at present only supplemental to the railroads, can in the nature of things be so perfected as to entirely supplant them. In this great industrial centre of Pittsburgh I will leave that phase of the question to your own imagination and conclusion.

It was the railroads that developed the great potential wealth of the Country, affording opportunity for the marketing of goods in varying directions, and giving impetus to further development and expansion of all kinds of activity, until the people of the Country are today reaping the benefit of products of the soil and minerals of the earth from every part of the land heretofore not within their reach.

Lord Bacon said many years ago: "There be three things which make a nation great and prosperous; a fertile soil, busy workshops, and easy conveyance for men and things from place to place." We have them all, but I might say that no matter how fertile the soil, if there are not adequate transportation facilities there will be very few busy workshops and the abundance of the soil will of necessity be left to rot where it grows. In fact, this is a condition existing at places today.

This view of the importance of the railroads as regards their functions and their relations to the public seems at times to be overlooked by many and often times there is direct opposition to activities in the public interest when there should be the most hearty assistance. The most important thing needed in this Country today is adequate transportation, and I mean by adequate transportation everything that might be necessary to enable the carriers to do efficiently all the things that a public servant should do. We have abundant evidence of the truth of this. We have the plants possessed of the potential capacity of providing the facilities, but there is a limit to possibility unless such plants are encouraged in development and expansion to meet growing necessities. The physical ability of the railroads in recent years has been taxed to the utmost by the rapid growth of the Country because of them, but there comes a time when they are at the end of their resources to expand *ahead* of the growth of industry and commerce which has overtaken them. We have had our experience with hampering control and found it a failure—now let us have a chance with freedom of initiative and enterprise.

In the hour of trouble and distress it is but natural for every mortal to turn to friendship. At the time of joy we likewise look to friendship. When gratitude fills our heart, what is its response—a friend. Friendship is what the world stands most in need of today. It is sad to note the changing attitude in this respect even among individuals—the drifting apart, not holding together by that strong bond of true friendship which we used to know of in years gone by and read of in the histories of the olden days. It is regrettable to think that such real friendship apparently is being smothered by the wave of "individualism" which has been spreading throughout the world and unfortunately already taken root in this Country. How was it that ancient Rome was able to conquer the world of that day? Through friendship between the individuals of the Empire translated into solid co-operation and loyalty for a common cause. Its mighty armies were adamant, working together for the benefit of all, with reliance upon their generals. As time went on, however, the seed of jealousy and desire for individualism took root in the breasts of the ranks, and flinging saide every thought of consideration for the general good, they became discontented and disloyalty followed as a natural consequence, resulting as it inevitably does in downfall. Coming down through the ages to the present time there are evidences of the disastrous results from the lack of that same friendship and co-operation which are the foundation rocks of success and prosperity.

While we may not, because of the strangely varying conditions existing in different parts of the Globe, fully expect for some time to come that world peace which we all so much desire, there is no justifiable reason whatever why we should not have the most desirable peace within our own boundaries. A house divided against itself cannot stand.

What is the cause of the deplorable state of unrest in this Country? There may be, in fact I think there are, several things which contribute to it, but the chief among them, in my opinion, is the cockle seed of socialism or communism, that has been sown by enemies among the golden wheat of Americanism. How did the enemy come in? Through our open gateway when with extended arms in friendship we bid the world come to us, the land of the free and the home of the brave. The forces at present working towards the dismemberment of the foundation upon which this Government was laid by our forefathers has been developing in rapid stages within recent years. We saw the first bold signs appearing when this Country went to war. The grumblings and lack of harmony from certain quarters before our Declaration of War showed the underworkings of destructive agents. Fortunately, however, when it became necessary for Uncle Sam to enter the conflict in order to make the world a better place in which to live, these seeds were temporarily submerged. They were not killed, however, so we find ourslves since the war again facing these deadly forces working throughout the Country endeavoring to poison the minds of our American people, particularly our American labor and American farmers.

Our greatest task, therefore, is to combat these adverse influences which are striking at the very vitals of our well-being, because they are trying to poison the minds of our American people against the American principles under which their Country has flourished. I would not have you think that I am an alarmist; no, nor have I any fear of the ultimate outcome, but every confidence and trust in the foundation upon which our forefathers built our Government to last till the end of time, and the truly American response of our people. But we must not fool ourselves that everything is all right, but meet conditions as they come before us. The importance of this was never more strikingly exemplified than during the late war, and the railroad systems of this Country played no small part in accomplishing the final result.

Therefore, it behooves us all as citizens to so mold ourselves to stand in solid mass against our common enemies which we have because of our greatness. The best way, therefore, is to begin at home, and there is no more potent channel through which to do it than through the railroads—the guardians of the public's progress.

It is hard for us to conceive the wonderful foresight and nerve of our forefathers who had the boldness to undertake on such a determined scale the building of a railroad which was theretofore untried, but were it not for the genuine friendship existing between them all and the public, which was equally interested in the project—all pulling together and not against—it would never have been accomplished. It is upon such co-operation that the railroads have grown and carried with them the Country's expansion. Of necessity they required freedom of action, otherwise they would not have accomplished what they did. Broad-gauge vision existed which fostered boldness of action. The necessity for that same spirit of mutuality and broadmindedness is equally, if not more, urgent today than it was then.

The railroads, as I have previously said, are public servants, charged with the duty of supplying adequate and uninterrupted service for the transportation of persons and things, and all else which that service implies. To do this the managers of the railroads must have capable and efficient forces giving of their energies in a like manner, that is, uninterruptedly and loyally, otherwise the carriers will not be able to perform the public duty with which they are charged.

Who, then, are the carriers? may be properly asked. They are all the employes in the broadest acceptation of that word. For, as you know, the President and other executives and supervisory officers are in fact employes of the Company in the same sense as the humblest clerk, mechanic, roadman or whatnot. Each has his duty to perform. Each shares in the responsibility. Their duties and responsibilities, of course, are different by the nature of things, but they are still all employes of the same public servant in the sense that they are all employed by another and do not as of themselves employ.

The President is responsible to the Directors for his stewardship. As you well know, it is much more difficult for the President to satisfy his several bosses than it is for the balance of the employes to please their single boss. The Directors, in turn, are in a sense employes of the stockholders, who are the owners. Now, the stockholder is the real boss and generally the sufferer when any suffering is to be done. Some of them have been obliged to suffer considerably during many months past, and may it be said in general they have borne it with fortitude and confidence. But there is a limit to that also. Of course, as previously stated, I am considering this feature in the abstract for the purposes of our present consideration of public relations. Therefore, as all employes, including officers, are the carriers, and the carriers must supply adequate and uninterrupted transportation service, this brings us to the point of how is this to be obtained and assured.

In my opinion, one of the most effective points of contact with the public is through the rank and file of the railroad organization. Every employe owes it to himself and to his company to so handle his job that he will be a credit not only to himself, but to his employer. It is through the local railroad men that the Company is largely judged by the public. There was a time when the employes of the various railroads felt great pride in saying that they belonged to the particular railroad by which they were engaged.

During Federal control this spirit seemed to have changed, not that Federal control was fully responsible for the change, as it had already been manifesting itself even before that time. However, because of the methods of management pursued during that period, the necessity or lack of necessity for which it is not my intention to discuss, impetus was given to its growth and finally the wave of dissatisfaction among the various classes of railroad employes swept over the Country to such an extent that the individual pride and loyalty so prevalent in former years was waning and the railroad management was confronted with a spirit of what might be termed "individualism," bordering on socialism or communism, which, in my humble opinion, is one of the reasons for the present unrest among railroad labor. To some extent it has been overcome in railroad circles, but there is much work yet to be done. It is alarming, however, to note that the same feeling that they have been wilfully wronged by the railroads is prevalent among the western farmers, brought about by agitators.

How are the railroads to meet this situation? Much has been said in the past about the relationship of the railroads to the public. This is a very important matter, as its foundation is truth. Truth about the railroads—what they are doing and why they are doing it. There are no secrets. After all, most of the difficulties in any situation grow out of lack of knowledge, misunderstanding, or no understanding at all. The railroads need the co-operation of the public and the public should have the co-operation of the railroads. The one cannot thrive without the other. Both must pull together for the general welfare of all, and if they do, success is assured, and if they do not both will fail.

The public generally, I believe, is taking a deeper interest in the problems of the railroads and seeing things in a clearer light and with sympathy. The business men are particularly active through their various traffic and other educational clubs, such as your own. All this helps wonderfully, but there is much more work to be done before we can feel sure of the future.

The Presidents and other executives of the carriers have been untiring in their efforts, through every possible direct and indirect means available, to lay before the public the truth with respect to the trials and tribulations which have confronted them, and to impress upon all the necessity for relief from undue burdens which have worked hardships upon their progress and development. They have not faltered and will not falter, but they cannot do it all.

It is incumbent upon each and every railroad employe, according to his station, to take an interest in the welfare of his employer, if for no other reason than the selfish one of his own welfare. The true result of this cannot be secured unless it is founded upon loyalty and loyalty cannot be looked for unless the individual is educated to an appreciation of his own responsibility. The clerk in the office, the machinist in the shop, the engineer and trainman, in fact each one in the railroad service owes a sacred duty to his company aside from the immediate job in hand. Each should be ready and willing to stand by the Company at all times with the same interest and loyalty that he would manifest were he running his own corner grocery store. The ticket agent, the freight agent and the train conductor are, in many instances, so far as the public is concerned, typical of the railroad they represent, because they more frequently come in direct contact with those who travel and ship. It is the duty of each and every one, therefore, to exercise every energy in the performance of their direct work, but furthmore as loyal employes and good citizens they should be willing to defend and not persecute.

Until we realize the wonderful power for good that rests with the large numbers of the so-called rank and file of the railroads, take them into our confidence, educate them in the truths and responsibilities of their work, we cannot hope to accomplish all that is to be desired with respect to our public relations. How may this be done? The executives, as I have said before, cannot do it all, but they in turn must rely upon the supervising forces to take an active interest in this matter of inspiring confidence and educating the employes directly under their jurisdiction. It should not be done in a spirit of coercion, but of friendliness. The rank and file are best inspired by the interest manifested by their superiors, and if confidence is secured good result is sure to follow. If we have good will in our own household there will be little difficulty in securing it in return from the outside.

In trade organizations and commercial enterprises "good will" is looked upon as a substantial asset. For even greater reason should it be so considered in the railroads. It cannot always be reckoned in dollars and cents, as it is intangible, but its value is unlimited. Take some of our great manufacturing enterprises, for instance. Were their physical plants to be destroyed at this moment their good will would live on and be the basis for reconstruction.

This, then, should be the aim of all in the railroad service. Those entering railroad service do so with assurances under the law that their interests will be protected, and in return for this it does not seem unreasonable to expect of them as their duty to the public to accept certain restrictions upon their freedom of action not required in other lines of employment. Being employes of a public servant they should be impressed with their responsibility of contributing towards the uninterrupted service required of their employer, be they clerks, mechanics or roadmen. It should not be necessary to suggest the thought of possible compulsion by law to secure this, and if we can re-establish among our truly American employes the high morale which used to obtain before it was disturbed by adverse influences I have no doubt that American railroad labor generally will respond to American principles.

On the other hand, what is the public's responsibility? The recent difficulties in the mining regions and the cessation of work in the shop crafts of the railroads were costly illustrations of the necessity for uninterrupted service. Following close upon the disrupted condition of the railroads after the war, before the railroads had opportunity to rocever, they emphasized in a way that it has never been emphasized before, that uninterrupted railroad transportation is vital to the prosperity of the Country.

The public can do most towards assisting the railroads by permitting them more latitude in the handling of the business. That the railroads should be regulated is, I think, generally admitted; in fact, to my mind, it is just as necessary for the good of the railroads as for the public at large that there should be a certain amount of proper regulation. The thought I have in mind might be crudely illustrated by reference to the local traffic situation along your city streets. When vehicles and pedestrians are moving to and fro in four different directions at a cross section of your thoroughfares, you see how quickly it becomes jammed when the traffic officer is not there. Every motor driver tries to nose his way through at the same time, with the consequence that there is much confusion, loss of time and possible danger, and while a few accomplish what they desire the great majority suffer. The traffic officer with the semaphore regulating this movement on equitable terms keeps the business flowing freely. That is proper regulation and sufficient regulation, but, assume that in addition to the traffic officer with the semaphore, there are several other officers in that vicinity telling the motor drivers and pedestrians when to move to and fro in accordance with the situation as he sees it in his own limited territory without proper regard for others who have equal rights, you can readily understand what difficulties would result. Further, assume for instance that some other officers of the law tell the people when to put on their brakes, when to take them off, when to throw in and out the clutch, how much gas to give the engine, and a number of other possible instructions, what would be the result at that street corner—blockade and pandemonium.

This situation is somewhat analogous to railroad regulation today. The National government, the State government, the city government, the town government, are all in their own several ways burdening the interstate railroads with a superabundance of regulations to such an extent that, instead of helping conditions, they are obstructing progress for the general welfare. The carriers should be relieved of some of the existing restrictions which interfere with the progress for general good and not subjected to new ones, the result of which we know not of. If the public will take an interest in this matter and see the folly of overburdening the carriers to such an extent that they cannot render the service desired and demanded, they are simply helping themselves because of their utter dependence upon adequate and uninterrupted transportation service.

The Transportation Act of 1920, which, as you know, was passed for the regulation of the railroads following their return by the Government after the war, taken all in all is the best legislation which the railroads have been called upon to operate under in a great many years. While in its present form it is not as perfect perhaps as might be desired, it reflects the most intelligent efforts so far made by Congress to regulate the railroads. It has not yet had a fair trial. Two years in the life of this Country is not sufficient time for a fair trial in such an important matter. Any attempt to make changes in that law until ample opportunity has been afforded to test its full merits would, in my opinion, be disastrous. It is hoped that the public may see the importance of not disturbing the precsnt fabric for a few more years at least, after which Congress would be in better position to determine in what particulars it might be altered to meet the full requirements of the Country.

In conclusion permit me to congratulate you upon the good work your organization is doing in passing along to others the important fact that the best interests of all rest upon helping and not hindering the railroads in fulfilling their duty as guardians of the public welfare.

PRESIDENT: Mr. Milholland has given us a most interesting paper on a very important subject, and I would like very much to have the members of the Club take part in the discussion. We would be glad to hear from anyone present.

MR. JOHN F. LENT: Mr. President and Gentlemen—The American Railway Association wrote in to the Secretary, and the Secretary turned over to the Subject Committee, a proposal that they might furnish a speaker for one of our Club meetings. We readily took up the opportunity to get an expression from one who would have the sanction of the American Railway Association. Therefore I felt very glad indeed when I learned that Mr. Milholland had been selected and that he had consented to come from Baltimore to meet with us and address us tonight.

The subject he presented in a very illuminating way is one that all students of transportation and traffic are studying constantly, namely, the relation of the public and the railroads to each other. I was impressed with one of the studies I made some time ago, that the railroad is said by the Supreme Court of Pennsylvania to be a creature of the public, that is to say the railroad obtains its charter from the people for its public performance, the same as a municipality obtains its charter. Therefore I reason that at the bottom of much of our railroad difficulties is the public's responsibility. Having been an advocate for a good many years from the so-called public's side or standpoint in treating with the railroads, I have observed a most gratifying tendency on the part of railroad executives to treat with the public more in the light of displaying facts and conditions frankly and thereby winning the confidence of the shipping public. And I think, as Mr. Milholland emphasized in his talk, that by a frank display of conditions on the part of both we are more likely to get to a correct analysis and a remedy.

I think we are all agreed that the carriers have had too much legislation and consequent regulation, and therefore the public can, if they will, take this creature, which is the chartered rights given to the railroads, and protect those chartered rights and improve the railroad situation, if they will lend a helping hand in removing some of the restrictive legislation and give heed to the ultimate outcome of too much legislation.

I feel much gratified that Mr. Milholland has been able to be with us tonight, and I wish it might be that he could address an audience that is not so well informed on railroad prerogatives and railroad conditions, but rather a public audience of shippers and the traveling public.

MR. D. O. MOORE: I am afraid I haven't anything to add. I have enjoyed the talk by Mr. Milholland very much. I think it is true there is too much legislation which hampers the railroads in providing the service the public wants. I think the public should be able to see some of these difficulties and consent to the removal of some of the obstacles so that the railroads can do a better job in providing the transportation that is required.

MR. A. E. ANDERSON: Mr. President, I have somewhat of a personal interest in Mr. Milholland as having been formerly connected with the legal department of the Baltimore and Ohio Railroad. Therefore, I enjoyed his remarks, especially the historical side of them, possibly, better than one who was a mere stranger to the situation.

There are two questions I would like to have Mr. Milholland answer and both of them arise under this Esch-Cummings law. One is the question of connecting lines opening their surplus terminal facilities to other lines for the purpose of exchange of freight, so that deliveries could be made from one line to another in case the line to which delivery is made had a traffic space open to do it. And the other is that the making of rates was put almost wholly in the hands of the Interstate Commerce Commission and thereby took it away from the 48 state commissions, which were a continual cause of friction for years past. I would like to ask how those two provisions have worked out, as it has come within his experience.

Following the situation as described by Mr. Milholland, I want to express the sentiment that has occurred to me for years and that is the main cause of the unrest that we find in labor circles today, the failure to distinguish between the personal equation of the lower grades, as we call them, in service of different kinds both on the railroads and in manufacturing in this country. The cause for the formation of labor unions has been a matter of self-defense, in that when a man is put over the direction of other men he is immediately called a "superior" officer, which in turn causes a reflex action upon the men under him, in the epithet "inferior." An Anglo-Saxon with full red blood does not want to work under the direction of another man, he wants to be his own boss. That is his ambition, and if he is put in a position where some man he does not consider any better than himself or any smarter than himself is made his superior, to whose direction he is subject, unless that authority is handled in a most tactful manner by the man charged with it, it causes friction. The fact has been that the man who has been given that authority has in a great many instances forgotten the position he was in before, and it may well be illustrated by the story that was current in railroad circles of a man in the section gang being appointed foreman, and the first thing he did was to turn around to one of his men and say, "Pat, you are fired." Pat said, "What have I done? I have been doing my work all right." "That's all right," replied the new boss, "you are fired, but you are hired again. I just wanted to show my authority." That is the very thing that has caused much of the unrest and the necessity for labor unions among the workmen to protect themselves from the arbitrary action of some man who had authority which he did not exercise with the proper tact.

That brings up this question of the use of the word humble, as Mr. Milholland used it. We call the watchman at the crossing, who stands out all night in the storm, a humble workman as compared with the president of the company, and yet he is a vital factor in the operation of every train while he is on service, while the president of the road is in the sleeper dreaming. The watchman's job should be considered the most important agent of the company at that time in the operation of the trains, rather than the president as the chief cook and bottle washer, as we generally see it in the papers. That is caused by failure to recognize the personal equation in the man walking the track, carrying his lantern up and down to see that the track is clear and safe, in comparison with the executive officer of the company, that causes these men to feel that they are not being fairly treated. It is that much more than the question of wages.

Bringing up the question that Mr. Lent touched upon, the question of information of railroad doings and operations and technique among the general public. Mr. Milholland comes here and talks to a crowd of railroad men who know in a general way the subject on which he speaks. But the general public who see a railroad train go by, go in the Pullman and go to sleep and get up in New York, haven't the remotest conception of the number of men who protect that train through the night. They do not appreciate the service of the railroad to the public. Mr. Milholland coming here gets just as far, for it is not possible for him to reach the general public, but it brings up the point I suggested several years ago, that this Club itself, with the men that are here, can perform a function in this community that no one else can perform, and that is that speakers be furnished by this Club to the various men's clubs connected with almost every church to give them the information that Mr. Milh has brought to us tonight. Only this afternoon, to illustr I made preliminary arrangements for the meeting of the Men's Club in Christ M. E. Church in January to have a representative of the operators and of the miners' union to explain to that Club the situation in the coal industry as it is today. That illustrates exactly what this Railway Club ought to do, and I will take this occasion to extend an invitation to this Club to attend that meeting.

I appreciate very much Mr. Milholland's study, and the Committee is to be commended for bringing him here, and he for taking his time to come, because the railroad situation now is at a very vital status that requires care and attention. And the great trouble with all these questions is that the business men who furnish the freight do not have a full conception yet of their relation as individual shippers to the railroad.

PRESIDENT: We would like to hear further from any of the members or guests. If there is no further discussion I will ask Mr. Milholland if he will be good enough to answer the questions and add anything further he may wish in closing the discussion.

Mr. F. X. MILHOLLAND: Mr. President—I wish I were able to answer off-hand the two questions which Mr. Anderson has put directly to me, but I do not hesitate to say that those subjects do not come in the ordinary course within my province, and while I may have some general knowledge regarding them, I do not feel qualified to respond with the detail information which I asume Mr. Anderson is seeking. However, if it is desired, I shall be glad to follow the matter up with the proper officers of the Company, who are more conversant with such subjects. I feel sure, however, that Mr. Fries, our Vice-President, in charge of traffic, would be pleased to advise Mr. Anderson should he desire to pursue the subject with him directly. I want to thank Mr. Anderson and the other gentlemen for their very kind expressions with reference to my remarks, and to say that if I have been the means of arousing your interest in this important question of the public relations of the railroads so that you might pass a good word down the line to the rank and file—to the mechanics, roadmen, crossing watchmen and others to whom reference has been made, as they are the men we want to reach—I shall feel amply compensated for my humble efforts. We are just as much concerned in them as we are in those round about us. That is our spirit and that is the idea I had in mind in suggesting the message that I hoped might inspire you with the same enthusiasm I feel in regard to this subject, so that all in every branch of railroad service might be impressed with that same sense of public duty in furnishing uninterrupted service as fills the hearts of the presidents and other officers "back home," who might be taking their well-earned rest while the crossing watchman is guarding the highway, as suggested by Mr. Anderson. I thank you all.

A rising vote of thanks was tendered the speaker for his very excellent paper.

There being no further business, upon motion the meeting adjourned. J. D. CONWAY,

Secretary.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Official Proceedings—Railways Club of Pittsburgh, published monthly (except June, July and August), at Pittsburgh, Pennsylvania, for October 1, 1922.

State of Pennsylvania }
County of Allegheny } ss:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. D. Conway, Secretary, who, having been duly sworn according to law, deposes and says that he is the Editor and Publisher of the Official Proceedings—Railway Club of Pittsburgh.

Publisher, Official Proceedings, Railway Club of Pittsburgh.

Editor, J. D. Conway, 515 Grandview Ave., 19th Ward, Pittsburgh, Pa.

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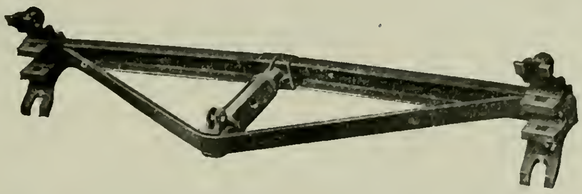

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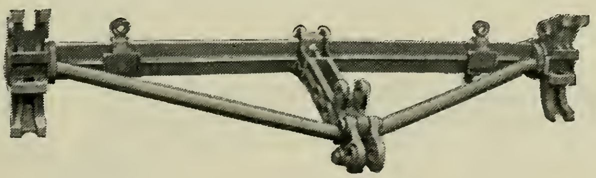

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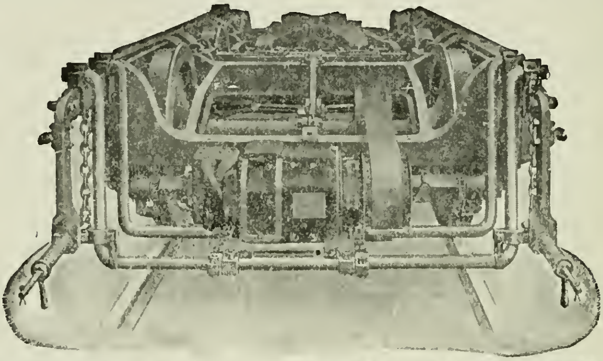

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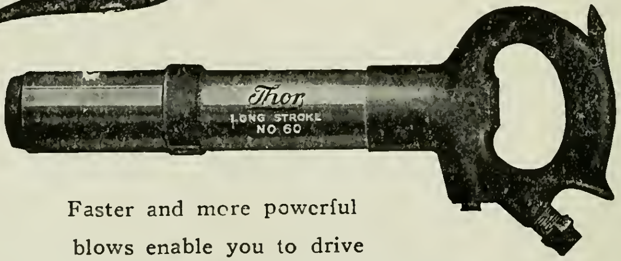

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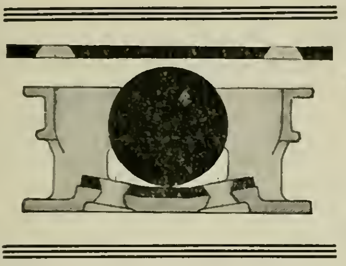

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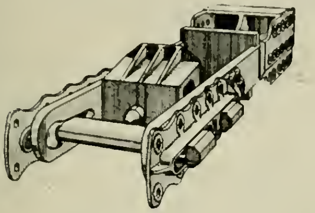

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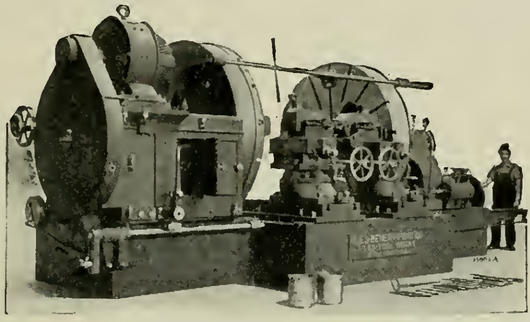

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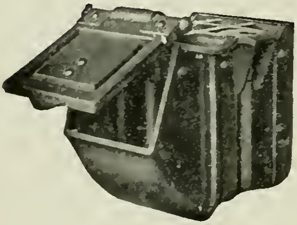

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No. 2

Pittsburgh, Pa., Dec. 28, 1922

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H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921

*—Deceased.

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Millar, C. W.
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Mitchell, F. K.
Mitchell, J. H.
Moran, J. V.
Morris, J. H.
McConn, G. E.
McDowell, D. W.
McGregor, D. C.
Newell, E. W.
Newman, J. F.
Noah, W. J.
Noble, J. A.
Orchard, Chas.
Osborne, L. E.
Parke ,F. H.
Partington, J. A.

Pehrson, A. K.
Perry, W. E.
Proft, J. W.
Rabold, W. E.
Read, S. C.
Renshaw, W. B.
Robbins, F. S.
Robinson, R. L.
Sattley, E. C.
Snyder, W. H.
Stenson, G. A.
Stevens, L. V.
Thomas, Geo. N.
Trueblood, H. J.
VanVranken, S. E.
Walker, J. W.
Walter, W. A.
Williams, R. W.
Wright, John B.
Wyke, J. W.

VISITORS.

Aldrich, H. H.
Allison, J. R.
Borg, John E.
Bulkeley, W. V. C.
Cady, Wm. M.
Caldwell, C. R.
Collins, H. M.
Cook, T. R.
Diefenderfer, D. L.
Downes, D. F.
Eisenbeis, Wm.
Fike, James W.
Fowler, H. W.
Fraser, S. A.
Frazen, J.
Garber, W. R.
Gasch, K. W.
Gray, R. E.
Gunnison, Walter
Henthorne, C. B., Jr.
Jex, W. S.
Jungbluth, Herbert
Kasnitz, Jess
Kintner, S. M.
Knowles, J. E.
Laughlin, R. J.
MacKenzie, James
Mahan, W. C.
Martin, Robert
Mitchell, W. S.
McCully, D. L.
McMahon, J. L.
Nelson, J. A.
Noar, H. A.
Rupp, J. L.
Shaw, C. B.
Smith, Sion B.
Stouffer, C. D.
Welsh, E. B.
Wills, R. B.
Youngquist, C. A.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Altmeyer, Harry, Trav. Car Insp'r, P. & L. E. R. R., R.F.D. No. 4, Box 82, Beaver Falls, Pa. Recommended by Samuel Lynn.

Burtoft, Wlliam Elwyn, Asst. Gen. Car Fore., P. & W. Va. Ry., 4028 Lydia St., Pittsburgh, Pa. Recommended by H. F. Patmor.

Caldwell, Charles R., chf., Delivery Clk., Purch. Dept., Penna. System, 706 Ridgevue Ave., Bellevue, Pa. Recommended by J. J. Kasnitz.

Carnahan, W. E., Director, Winfield Railroad, 2215 Oliver Bldg., Pittsburgh, Pa. Recommended by F. C. McKee.

Cherry, James T., Roadmaster, P. & W. Va. Ry., 626 Grandview Ave., Carnegie, Pa. Recommended by R. L. Barrett.

Cook, Thomas R., V. P. & Gen. Mgr., Westinghouse Union Battery Co., 5443 Forbes St., Pittsburgh, Pa. Recommended by S. E. Van Vranken.

Fike, James W., Movement Director, Penna. System, 7623 Race St., Pittsburgh, Pa. Recommended by W. L. Hudson.

Fults, J. J., Clerk, Jones & Laughlin Steel Co., 18 So. Euclid Ave., Bellevue, Pa. Recommended by John H. Fults.

Kasnitz, Jesse, Delivery Clerk, Purch. Dept., Penna System, 5715 Rural St., E. E., Pittsburgh, Pa. Recommended by J. J. Kasnitz.

McIntyre, Frank A., Yard Master, P. & W. Va. Ry., 30 Ridge Ave., Crafton, Pittsburgh, Pa. Recommended by R. L. Barrett.

McKirahan, J. R., C.C. to T. M., P. & W. Va. Ry., 5527 Hays St., E. E., Pittsburgh, Pa. Recommended by R. L. Barrett.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

As there is no further business to come before the meeting, it gives me great pleasure to introduce the speaker of the evening, who will speak to us on Radio Communication, something we are all intensely interested in and will become more and more interested in from a business standpoint. As you know, some of the railroads have already installed radio communication from place to place and some are experimenting in radio communication from station to train.

The speaker has had a great deal of experience in radio matters and is the Director of Research Department of the Westinghouse Electric and Manufacturing Company of our city. I have the honor of introducing to you Mr. S. M. Kintner.

"RADIO COMMUNICATION"

By S. M. Kintner

Two of your members came to me this evening and asked if I had a set speech. They followed that by asking how long I would take. Just to show you that I am going to keep within reasonable limits I will place my watch where I can keep an accurate account of the time. I will judge of your interest in what I have to say by noting how you act. So if you find that what I am saying is losing interest you can readily stop me by a few simple movements which indicate that I am through.

Pittsburgh should have a very great interest in radio, for some of the greatest inventions in that art were made here. Some twenty years ago, twenty-two, to be accurate, Professor R. A. Fessenden, then a professor in the University of Pittsburgh, at that time known as the Western University of Pennsylvania, undertook some investigations that resulted in revolutionizing the art. The art as it was at that time was the one that Marconi had announced. His system was built around a particular device that he had perfected. This device, called a coherer, was said to be the heart of the system. It was a trigger actuated mechanism which, when the voltages resulting from the electromagnetic waves was impressed upon it, caused it to change its condition and allow the energy of a local battery to flow through it and thus actuate some mechanism. It was defective in that it required to be reset after each operation. That limtied the rate at which it could operate and also destroyed the possibility of its giving any character to the incoming signal. The coherer, when it was tripped, operated a telegraph sounder. Then it was tapped to restore it to its initial condition and was then in condition to operate a second time, Of course, this required considerable time, and for telephoning, where the interval is of the order of 1-1000 of a second, was an unthinkable condition. Yet the coherer around which Marconi built his system was generally thought to be the most marvelously sensitive instrument that man had ever devised. Fessenden had studied the coherer considerably and he reached the conclusion that the coherer was absolutely wrong in principle, and in spite of the fact that all the world was singing its praise, Fessenden started out to build a new mechanism that would work on a different principle. He set himself this task: His receiver must be constantly operative and must give results proportional to the amount of the received energy. He produced such an instrument and with it found that as he received the incoming signals from distant stations he could distinguish different transmitting stations by the peculiar characteristics of their spark tones. It occurred to him that if it was possible to transmit those different characteristics, it should be possible, if he could only find the means of controllng the differences, to transmit sounds, even to transmit speech. So he set himself the task of proving that it could be accomplished. He did it in the most direct way. He took an ordinary telephone microphone, put it in the antennae of his transmitting station, increased the number of sparks in his discharge at the station from 1-1000 to several thousandths of a second, and then had his assistant talk into the transmitter while he listened at the receiving station and heard the words of his assistant come by means of the radio. That was the birth of wireless telephony. Fessenden, of Pittsburgh, therefore,was the inventor of wireless telephony.

He took out patents which have been upheld by the courts and he is generally recognized, by those who are familiar with the art, as the one to whom we are indebted for this marvelous achievement. He started this work in Pittsburgh in 1899. He continued it for the government and later for a company organized with Pittsburgh capital and brought it to a satisfactory operating condition.

I find myself somewhat embarrassed these days in trying to talk about radio on account of the following condition. There are such differences in the audience as regards their knowledge of the art; that a part of them are quite familiar with all the terms and the uses of the various pieces of apparatus, while another portion have not the faintest idea of such condtions. While one is trying to interest the one, they are boring the other. To make this understandable to those who do not know much about radio, I am going to start near the beginning. A radio telephone set and a radio telegraph set are the same thing excepting in the method of control of the radiation. There is no difference otherwise. In both we have a radiating antenna which consists of an overhead structure, generally consisting of wires stretched out in the form of a harp, in length from 100 feet up to a mile or more. These are connected through the exciting electric apparatus with the earth. That essentially is a transmitting station. That enables us to take electric currents of a particular form, such as direct current or low frequency alternating current, and convert it to another form of higher frequency alternating current. For our ordinary power transmission we use frequencies of 60 cycles per second. We use for radio for telephone broadcasting approximately 800,000 cycles. That is the current goes through a cycle, starts first in one direction, reaches a maximum, then goes back to a maximum in the reverse direction and then comes to its initial condition 800,000 times per second.

When we have currents of that frequency charging a conductor system above the surface of the earth ,there is a dissipation of a part of that energy by radiation out into space. This is by waves that keep increasing in height as they recede from the station. There are several means of getting this high frequency oscillating current. First, we started with spark discharges of energy that is stored in condensers (an electric condenser being two metallic surfaces separated by an insulating medium) and released through a circuit which includes a spark gap. When these surfaces are charged until the pressure exceeds the dielectric strength of the air between the spark gap, it allows that energy to discharge from one surface to the other. As it discharges it passes through a coil. The coil has the effect of inertia and this overcharges this condenser in the reverse direction. The charge immediately starts back, just as a pendulum oscilliates. By means of a condenser discharge we can get any frequency we choose, because there is no mechanically moving part and we are not limited by centrifugal forces. That was the first means employed in producing high frquency currents to radiate energy into space for radio purposes. This was discovered by Heinrich Hertz, so the waves are frequently termed "Hertzian waves."

This plan of radiating from a discharged condenser continued until about 1906, at which time—here we bow again to Fessenden—it was proposed to use a high frequency alternator without any spark discharge, without any condenser, without anything but an antenna system and the high frequency alternator connected to it and to the earth. He found when he operated this apparatus he was able to discharge his antenna and get radiation just as he had before from the high frequency discharge of the condenser. However, he got it much more effectively, because in the case of the condenser discharge it was just like a pendulum, swinging to a gradually lessening amplitude, while with the high frequency alternator condition each wave was of the same height. Each has the same amplitude as the one which preceded it and there is no interval of inactivity between the consecutive discharges. A very good analogy is the picking of a mandolin string. The mandolin gives a vibration frequency determined by the tension and the weight of the string, etc. With a high frequency alternator the frequency is determined by the alternator and is constant just as long as the alternator spread remains constant. That is the accepted method today for all high power long distance transmission.

Unfortunately it is impracticable to build alternators of sufficiently high frequency to cover the whole desirable range. You cannot build an alternator for frequencies above 100,000 cycles per second, and when you get to that frequency you are working the heat of all known materials to the utmost. It was found, however, that it was possible to get high frequency discharges from arcs of certain types. Poulsen of Denmark produced an arc capable of setting up high frequency discharges that has been quite generally used and is still in use in a number of stations. For certain purposes it is very effective. The arc, however, is rapidly giving way to another mechanism that has come in, which is known as the thermionic tube.

We have then three different sources as available means of getting high frequency alternating current to feed into an antenna to get radiation. The telegraph we simply make and break the circuit, thus feeding the antenna and get radiation following this make and break and thereby send out dots and dashes. In the telephone we must not interrupt it. We simply modulate or change the intensity of that radiation to conform to the sound wave that is imposed upon the control mechanism. Now think back to the radio broadcasting station with its 800,000 cycles per second, and a high pitched soprano tone with about 1,024 cycles per second; there will be 800,000 of those radio waves taking place during one change or vibration of the soprano's voice. So we have quite a number of waves over which to make our gradual change in producing the modulations without having any practical lack of regularity in the action. If you can do this for 1,000 there is no reason why you cannot do it for 2,000 or even higher. We find it necessary, in order to get accurate reproduction of music, to use frequencies of as high as 6,000 or 7,000, that is, we have to deal with overtones. We have therefore to provide a mechanism to modulate this transmitted energy to allow it to follow accurately frequencies as high as 6,000 or 7,000 cycles per second. The radio frequency as it goes out from the broadcasting station is constant, regardless of the intensity of the signal that may reach you. We only vary the amplitude, keeping the frequency constant. If we varied the frequency we would throw it in and out of tune and thus create considerable interference in changing the wave frequency over a broad band.

These alternating currents, or any alternating current, passing through an electric circuit, go through most readily when that circuit is adjusted with just the proper relation of its inductance and capacity. Now a circuit is said to be resonant to a particular frequency when it is so adjusted, in reference to its inductance and capacity, that an alternating current of that frequency passes through it most readily. If you influence that circuit by an alternating source which is of that frequency, you will affect it to the greatest extent. That is what we term "tuning" in a radio system. We tune our antenna system so as to radiate a particular frequency. That determines what the frequency will be. And we can adjust and hold to any frequency by adjusting either or both of the two constants, inductance and capacity.

When we come to the receiving system we find we have currents set up in the receiving instrument which are created by the extraction of a certain amount of energy from the onrushing waves as they pass the antenna. These little currents oscillate back and forth in the antenna in step with the onrushing waves. We change the inductance or capacity of it so as to make the natural period of the receiving circuit the same as the frequency of those onrushing waves and we get a very much greater effect than we will for any other adjustment.

On the other hand, to drop this general thought for a moment, if we happen to be near another station sending on a different frequency from the one we are trying to receive or listen in on, even though we get a hundred times as much effect by being in tune with the distant station as we would if we were out of tune, that may still not be sufficient difference to cover the difference between the distant station and the nearby station and you have the interference element creeping in. This tuning only gives you a certain ratio between the energy forced in from an out of tune station and the energy forced in by a station that is in tune. That is of the order of 100 to 1. That difference changes with the circuits and with the apparatus employed. If the apparatus takes the energy from the circuit at a rapid rate to operate the indicating mechanism, it is just like having a pendulum swing from a support that has a large amount of friction, it damps it down. Therefore the difference between the maximum signal you get between the "in tune" condition and the "out of tune" condition is a smaller ratio than 100 to 1. Contrast to that condition a circuit arrangement in which that resistance is reduced to practically zero, then the ratio goes much higher than 100 to 1 and we get a very much more marked difference between the "in tune" and "out of tune" station. We speak of our receiving set as tuning very sharply when the ratio is high. At present we rely mostly upon resonance as the means of selection between stations. There are other ways of minimizing this effect, by what are called rejector circuits. These have the inductance and the capacity in a shunted relation and placed directly in the antenna, you then tune the rejector part to the frequency of the station you want to exclude. That has the effect of acting as a trap. The signals to which it is resonant come into that and do not go on through. The signals to which it is not tuned go on through and actuate the mechanism which is beyond. As you go beyond these simple conditions you get into more and more complicated ones that make it substantially impracticable for the average person to use. In the transatlantic work where they have a station working on a fixed wave length twenty-four hours a day with skilled men in charge of each particular part of the system, they can receive over these exceedingly complicated systems and keep in operation throughout the twenty-four hours.

It is possible by "loops" to get certain directional effects. You can have loops as small as two feet in diameter and by proper circuits and amplifiers receive transatlantic signals. These loops have the property that, when they are out in an unexposed territory, they operate very much better when the plane of the loop is in the direction pointing toward the transmitting station and the result is practically nil when it is vertical to that line. Unfortunately when you place a loop in a congested district where there are a large number of receiving stations, all these little receiving stations, which may be open antennae, become radiating antennae, particularly when they are receiving with tube sets. Therefore, while the loop has its directional effect from the main station, it also has directional effects from each of the other in other directions, depending on the number of receiving stations in their critical condition, this destroys a large part of the value of the loop in excluding interfering stations.

Let us go back to the thermionic tube. Professor Fleming discovered about 1905 that he could employ a structure very much like an incandescent lamp with a filament in a vacuum and a small metallic surface carried by another conductor and insulated from the filament and when the filament was heated it had the peculiar effect or property of allowing current to pass only in one direction. It occurred to him to use that in a radio circuit to rectify the excessively high frequency currents. You cannot build a mechanism that will respond directionally to such frequencies. Even if you could it would not affect any of our senses. It is too high to produce any sensation of hearing. So we must convert it from 800,000 cycles to one within the range of our senses. What is commonly done is to lower it by a rectifier. The alternating current is compelled to go through this "check valve" system and it takes these little currents in one direction and accumulates them as a condenser and gradually give them out at a slower rate. Fleming used this device, which he called a valve and which is generally called the Fleming valve, as a means of rectifying the high frequency currents and bringing them within the range of audible limits. This was used by the Marconi Company rather intermittently for a matter of three or four years. About this time the DeForest Company were in serious trouble on account of having several hundred sets equipped with radio equipment which the courts decided infringed the Fessenden patent. In this desperate condition, necessity being the mother of invention, DeForest took the Fleming valve and put another electrode in it. It had previously consisted of only a filament and plate, but he added a third one which was the controlling member of this system. It was the throttle valve as it were. With a small amount of energy in the control part of the tube you could control a large amount of energy between the filament and the plate. As the result of this he produced a very effective way of adding energy to the circuit at the receiving station, amplifying the strength of the signal that was received. He got a signal that was seven or eight times as great as the signal that came in originally. The DeForest tubes were not very well made. The art had not progressed so they could count on this device with any certainty. While occasionally one got a tube that gave marvelous results, the general run of them were very erratic. That delayed very much the general adoption of this device.

The next marked advance in the art was made by a young student at Columbia University, New York—Edward H. Armstrong. In experimenting, he told me, one day he thought he would see what would happen if he tuned the plate circuit to the same frequency as the incoming signal, and he was surprised to find that he could magnify the strength of the signal he got in his output circuit. He did not know why this result occurred. He found also that if he forced it too hard he changed completely the character of the signal that came in. He was very much puzzled as to why that result followed. He set about, therefore, to make a serious study of the whole phenomena. He made a very complete study and his theory of the operation of that device is the generally accepted theory today. He found that when he made this particular arrangement he was "feeding back" some of the energy that his battery circuit was supplying over into the alternating circuit that brought the signal energy in from the distant station. As the other signal gave him a certain strength of signal on the output, he fed some of that back into the original again and it came through a second time. He just kept on running around that circle. The limit was reached when the tube started to oscilliate at its own frequency. When he fed back too much energy the tube started a cycle of its own frequency. He thus discovered that a tube could be made to generate high frequency oscillating currents. The Armstrong discovery of this regenerative effect and the possibility of making the tubes oscillate so they became generators of high frequency alternating current was of prime importance and interested some of the large manufacturing companies. The Armstrong discovery was made in 1912 or 1913, just before the war broke out in Europe. The DeForest tubes were not well enough made to work satisfactorily so the Western Electric and General Electric companies started a study of these tubes, how they could be improved. As the result of that research work started by these two companies, the tubes were gradually improved so that today we have tubes ranging from very small amplifying tubes up to tubes capable of developing 100 k.w. of alternating current energy. When we speak of tubes of very small amounts we mean tubes working with very small fractions of a watt, about 1-100,000,000. That is a good strong signal in a receiving antenna. That is enough to operate a receiving telephone but not to operate a loud speaker. You can get more current by using more tubes and amplifiers. The limit is reached when the noises that are introduced by this process of transformation become so great that further amplification is not advisable.

Now the several requests that were made for not too much talk make me think that I had better close here and allow you to ask questions that may indicate the line of further discussion that you may desire.

MR. A. E. ANDERSON: Mr. Kintner has told us a fascinating story of familiarity with this whole process. With all this research into its operation have you approached any theory of what electricity is, as compared with other forces?

MR. S. M. KINTNER: I am going to say frankly that I do not know what it is. However, I do not feel any embarrassment in this admission. I am going to ask you if you know what light is, what gravity is, what inertia is, what heat is, and a lot of other things that we have used so long that we are accustomed to our ignorance of them.

MR. F. H. PARKE: I would like to ask the speaker whether he believes it possible that radio may be developed to that extent that would permit the transmission of power or possibly lighting circuits or heating circuits such as are used in domestic service.

MR. S. M. KINTNER: I would not say that anything is impossible in connection with radio or any electrical development. But as we see it today, the difficulties facing such a system are very great. As you speak in a room like this your voice goes out in all directions. If you want to deliver that voice to one particular place you use some speaking tube or some sort of directional apparatus. In radio we are talking out loud, as it were, right out into space and the energy you are dissipating goes in all different directions so that the amount that arrives at any one place is a very small proportion of what you start. A transatlantic station operates with about 50 k.w. of energy radiated into space. The energy that is received at the receiving station on the coast of America from a European station is of the order of about 10 to the minus 15th part of a watt. You can see the efficiency of such transmission. The utility is there but the efficiency, the ratio of input to the output, is exceedingly low. You may ask why we do not direct this in some particular limited channel. That is an exceedingly difficult thing. A lot of work has been done and more is being done in trying to accomplish that. If you undertake to reflect a beam of any kind you must have your reflecting surface a number of wave lengths in dimension. A wave length of a radio system for broadcasting is 360 meters long; therefore, when you think of a mirror even approaching the dimensions of one wave length of 350 yards, and it should be several wave lengths to have any efficiency at all, it is apparent that it involves very large structures. In transatlantic service where the longest wave length employed is 22,000 meters, 15 or 16 miles, you can hardly imagine a reflecting surface that could be erected and maintained. As I look at it today, while I would not say it is impossible, the difficulties are very great and it does not seem to be anything that can be immediately attained.

MR. A. E. ANDERSON: What effect have the receiving stations upon the force of the wave as to its continuing beyond a certain line of stations? Does each receiving station absorb energy that weakens the energy for the next station in the line?

MR S. M. KINTNER: As I picture it, that is the case. As to just how far that extends we do not know. A certain amount of energy that previously existed in the wave has been converted into a current that goes into these antennae, therefore that wave has had just so much energy taken out of it. It is a very small amount. Buildings have the same effect, as do trees. All absorb a certain amount of this energy. There is a noticeable difference in the transmission distance you can get over different kinds of territory; over ground with many trees and buildings the distance may be cut in half. Where the subsoil is different it may absorb more. Topographic conditions have great influence on the effect and efficiency of transmission. Titusville and Oil City seem to be particularly difficult to reach from Pittsburgh, while on the other hand they hear Newark and Springfield and Chicago and other stations more distant with good strong signals. That same effect is noted in other directions.

MR. A. E. ANDERSON: Then between Marconi and Fessenden is it correct to say that Marconi developed wireless telegraphy and Fessenden wireless telephony?

MR. S. M. KINTNER: Yes, I think that is a very accurate statement. I like to think of Marconi as the Morse and Fessenden as the Bell of radio.

MAJ. H. L. BEACH: You speak of antennae a mile long. It that all one wire or is it supported?

MR. S. M. KINTNER: They have insulated supports, like any ordinary telephone wire, with towers and cross arms. Antennae systems do not have excessively high voltages, 100,000 to 150,000 volts. It is not a difficult line insulating condition.

MAJ. H. L. BEACH: I was in Utah and in one particular place they found it impossible to get any radio receiving station that would give any results at all. They strung a wire across that chasm. If it had been strung lengthwise would it have made any difference?

MR. S. M. KINTNER: That would depend entirely on where the radio transmitting station was located. Any conducting surface will reflect and thus block further transmission in that direction. Like a mirror. It has been noticed right outside of San Francisco that in certain positions when the ships get in the shadow of some of those hills, they cannt hear the transmitting stations in San Francisco. When they get out of that shadow the transmission comes in again, the intervening medium being a conductor.

PRESIDENT: It would be interesting if Mr. Kintner would explain a little more in detail the differences in wave length, as to just what the possibilities of subdivision are. We have reason to be interested in the total capacity of the air for radio.

MR. S. M. KINTNER: The late Emperor of Germany called a convention several years ago of the Powers and they drafted a set of radio resolutions or regulations that were adopted by all countries and they attempted to apportion all the wave lengths. As most of the countries represented were countries in which the military was the predominating influence and in which the national safety of the country was the only thing that was thought of, they apportioned these wave lengths largely for military and governmental purposes and uses. It is exceedingly difficult to break away from that condition. As a result of that, we have a reserve band from 600 to 1,600 meters which is reserved exclusively for navy and army use and from which all private interests are supposed to be kept out. That is not strictly adhered to here, but that is the condition that is supposed to exist. When you go below 600 meters our government has set aside certain reservations for certain uses; for instance, 450 for certain radio beacons and small vessels that cannot carry antennae of sufficient size to operate effectively on longer wave lengths. Below 450 there is no particular reservation until we get down to about 200. At 200 and below the amateur has his full sway. That is his field.

Within this there is talk of carving out another reservation for the army and navy for airplane service and special military use. We are practically confined to a limit between 450 and 200 meters within which to broadcast out telephone operations. When this broadcasting came in the Department of Commerce were unprepared for any such condition as grew up out of it and when they were applied to for a license they assigned 360 meters. The next person who applied for license also got 360. And so on and on. They soon began to interfere with each other. People were, of course, trying to get other wave lengths. The government claimed they had no authority to assign any other wave length. Finally there were so many complaints that Secretary Hoover created another class of stations at 400 meters, Class B Stations. Then everybody applied for Class B stations and the first thing we knew there was less interference at 360 than at the preferred class at 400 meters. The department officials have winked at a certain departure from the 360 and 400 meter waves. They go to some other wave length and try to avoid as much interference as possible. Thus with no systematic regulation they are interfering with each other all the time. It is nothing unique for St. Louis to interfere with Pittsburgh, or Louisville, or Newark, and the situation has become quite serious.

Mr. Crawford has asked the possibilities of separation. When a receiving tube is fixed so that it is regenerating strongly and starts to oscillating at its own frequency, it becomes an alternating current source and makes your antenna a transmitting station. It has a small amount of energy, but still it is a transmitter. If your tube is oscillating and your neighbor's tube is oscillating and you move your inductance or capacity and go through his wave, you will hear a whistle. That is caused by his tube oscillating and your tube oscillating, "coming into step." When they are in step there is no resulting interference. As they are out of step the interference is more rapid as they are further out. As the interference increases it finally gets so rapid that it goes out of the range of audibility. That is what limits the space that must be put between the two stations. If Louisville is working on 360 and Newark on 362 or 363, the difference between these two is just sufficient to set up a whistling sound and you will not hear either one of them, but you will hear that whistling. Therefore to get proper spacing, they must be far enough apart to insure against this whistling condition. That is generally taken as requiring about 15,000 cycles separation. Figuring 800,000 for 360 meters, you must break them up into groups in which the frequency is separated into 15,000 for nearby stations. It has been estimated that there is room within this wave band for about 25 or 30 good, strong stations, properly located geographically with reference to each other and with properly selected wave lengths to get good results without interference.

MR. A. E. ANDERSON: Is it possible to determine upon a given wave length as being most efficient under all circumstances?

MR. S. M. KINTNER: A particular wave length may be most efficient for any particular station, but it is not most efficient for all stations. The shorter the wave length the more effectively it radiates but the more difficult it is to control. If you have a wave length which is resonant to some guy wire nearby, that may absorb a large part of the energy. We always check up by measuring the antenna resistance for various wave lengths and this indicates the absorbing tendency of these nearby bodies.

MEMBER: How can you tell that with your radio set?

MR. S. M. KINTNER: By measuring the regular antenna resistance.

PRESIDENT: Are there any further questions?

MR. A. E. ANDERSON: We have had a splendid evening, so much so that we are an entity of vibrations, as the speaker described it. Therefore, I think we should extend a rising vote of thanks to the speaker for the entertainment and the information he has given us.

The motion prevailed by unanimous vote.

PRESIDENT: If there is no further business, a motion to adjourn will be entertained.

Upon motion the meeting adjourned.

J. D. CONWAY,
Secretary.

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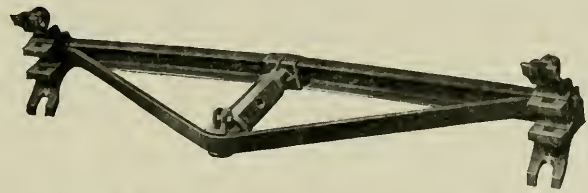

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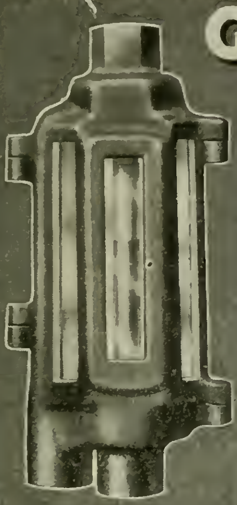

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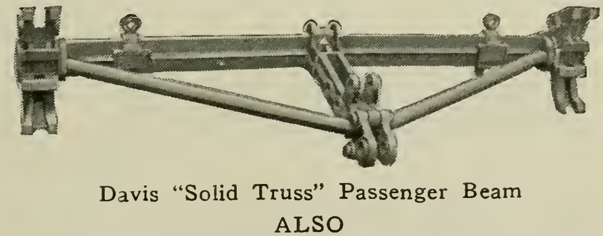

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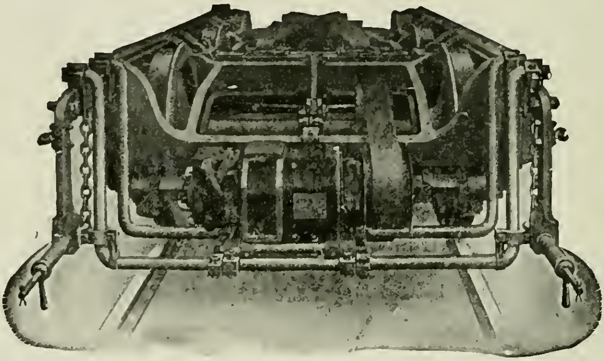

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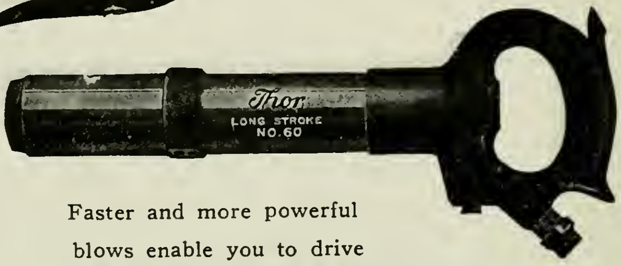

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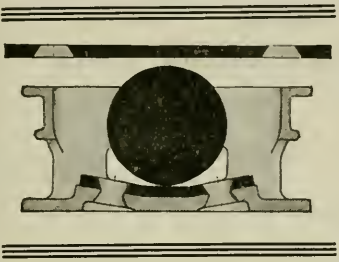

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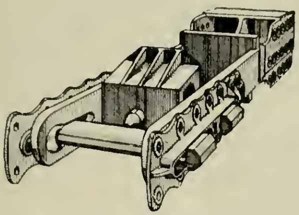

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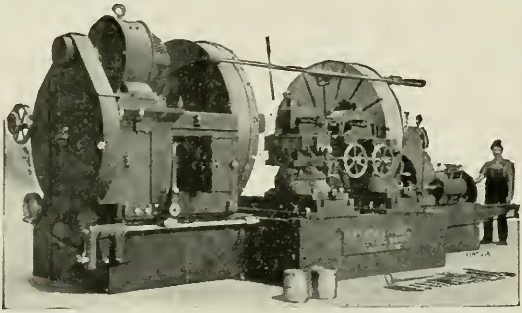

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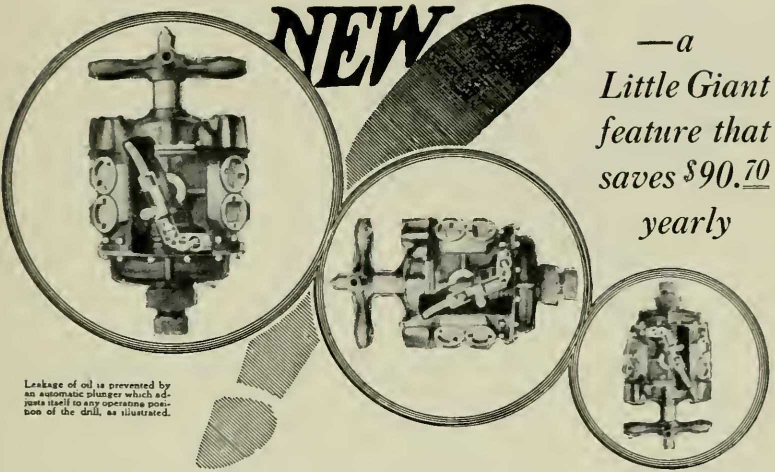

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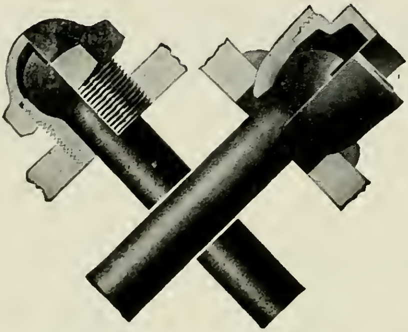

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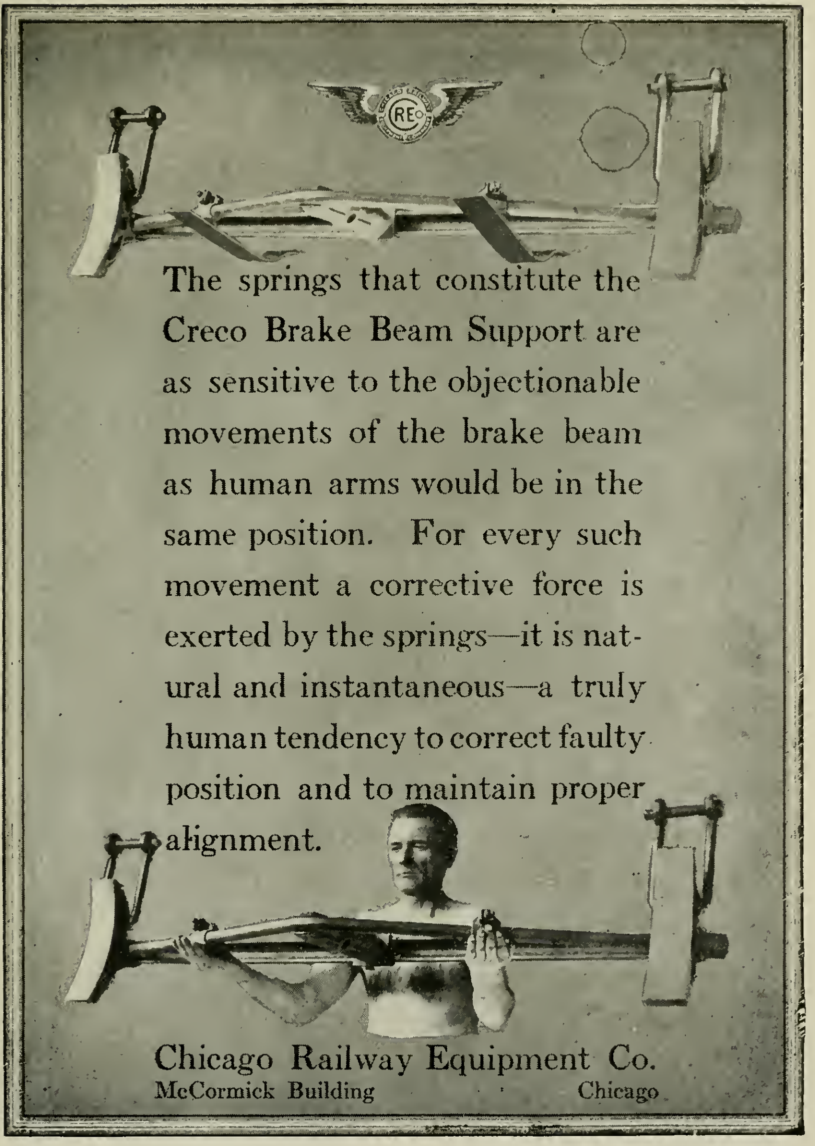

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*—Deceased.

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Brown, W. E.
Carlsson, John
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Cunningham, R. I.
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Fair, Chas.
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Freshwater, F. H.
Fults, J. H.
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Geisler, Jos. J.
Giles, D. J.
Gilg, Henry F.
Gray, G. W.
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Holmes, E. H.
Howe, D. M.
Huchel, Wm. J.
Hudson, W. L.
Hughes, Wm.
Hussong, A. C., Jr.
Johnson, A. B.
Johnson, E. A.
Jungbluth, Adolph
Kasnitz, J. J.
Kasnitz, Jesse
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Kelly, Leo J.
Kempf, G. P.
Kinch, L. E.
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Lanahan, Frank J.
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Maxfield, H. H.
Merscher, John
Meschter, E. F.
Millar, C. W.
Miller, James
Mitchell, John H.
Mitchell, T. J.
Moyer, Oscar G. A.
McIntyre, F. A.
McNulty, F. M.
Newman, J. F.
North, D. P.
Ogden, Geo. D.
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Rankin, B. B.
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Read, S. C.

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Reynolds, D. E.
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Snyder, W. H.
Staman, Harry Z., Jr.
Stamets, Wm. K.
Stumpf, F. L.
Summerfield, D. W.
Taylor, H. G.
Thiele, Chas. F.
Tucker, John L.

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Archibald, Jas. D.
Ballantyne, Wm.
Barber, W. H.
Bergman, C. H.
Borg, John Edw.
Brozier, Chas.
Conlon, John F.
Coyle, J. Alexander
Curtis, Dr. H. D.
Dimmick, J. G.
Doke, G. E.
Enderlin, C. J.
Faux, Roy
Hanhauser, A. J.
Harris, Arthur R.
Hazen, H. M.
Jex, Wm. S.
Jungbluth, H. A.
Kegel, A. E.
Kling, Henry
Laughlin, R. J.
Lewis, J. A.
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Ozias, Benj. H.
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Ruffing, M. L.
Salisbury, G. H.
Salisbury, R. C.
Shaffer, O. D.
Smith, Sion B.
Snyder, Jos. C.
Stauffer, C. D.
Thompson, Alex.
Warrensford, F. S.
Wells, Franklin H.
Westwood, G. T.
Ziegler, William
Zimmerman, A. J.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Borg, John Edw., Chief Draftsman, Julian Kennedy, 232 Martsolf Ave., West View, Pa. Recommended by John Carlsson.

Case, Harvey F., Route Clerk, Penna. System, 520 Sixth Ave., McKeesport, Pa. Recommended by J. J. Kasnitz.

Conlon, John F., Clerk, P. & L. E. R. R., 547 Canal St., Beaver, Pa. Recommended by P. J. Fink.

Marshall, L. L., Gen. Supt., Lake Erie, Franklin & Clarion R. R., Clarion, Pa. Recommended by E. K. Thomas.

Maurer, O. J., Designer, Westinghouse Electric & Mfg. Co., 606 Mill St., Wilkinsburg, Pa. Recommended by A. Stucki.

Simpson, Robert, Piece Work Inspector, P. & L. E. R. R., Newell, Pa. Recommended by M. L. Harger.

Smouse, Robert, Ticket Agent, P. & L. E. R. R., Newell, Pa. Recommended by M. L. Harger.

Warrensford, Fred S., Clerk, P. & L. E. R. R., 2839 Fifth Ave., Beaver Falls, Pa. Recommended by P. J. Fink.

Williams, William G., Yard Master, P. & W. Va. Ry., 221 Singer Ave., McKees Rocks, Pa. Recommended by R. L. Barrett.

VICE PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

Announcment was made of the death of Mr. W. K. Steele, Chief Transportation Clerk, Freight Department, Pennsylvania System, date of death not known.

VICE PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

Is there any other business? If not, that brings us to a very interesting part of our program this evening. We have with us Dr. H. D. Curtis, Director of the Allegheny Observatory of our city, who will address us upon the subject, "Our Stellar Universe." Most of us know Dr. Curtis by reputation and I know there is a treat in store for us.

"OUR STELLAR UNIVERSE"

By Dr. H. D. CURTIS, Director,
Allegheny Observatory, Pittsburgh, Pa.

MEMBERS OF THE RAILWAY CLUB: It is with a good deal of hesitation that I come before you tonight to take you on a far longer journey than you may have ever dreamed of. You are accustomed to fairly large numbers when you sum up your aggregate work in the railroad field; for instance, in 1920 you and your comrades in the United States, in ton-miles and in passenger-miles, did the same thing as transport one ton a distance of over 400 billion miles, and one passenger nearly 60 billion miles. We must consider, then, the method of transportation which we shall use on this our journey.

"Transportation is civilization," writes Kipling. In another one of his delightful stories, where he goes in spirit to the days to come one hundred and fifty years in the future, and tries to depict the world as it may have developed by that time, we read that the nations of that future day are permitted to wage war, provided that it "does not interfere with traffic and all that that implies." So there is no longer any war, because war certainly "interferes with traffic and all that that implies."

Now, our transportation will have to be "special." I shall have also to use some very large figures in telling how far we journey. Do not imagine that the astronomer has any advantage over the rest of you in comprehending such mighty numbers, for he can not visualize it any better than you. We can think, since the war, of a billion marks or a trillion rubles, because we have some standard which we can understand, say the good old dollar, with which to compare them. But neither you nor I can comprehend really what a million miles means; it is too much for us. A hundred years ago, when English gentlemen frequently made curious wagers, one gentleman bet another that he could not make one million strokes of the pen in a month. It meant only 60 strokes per minute, ten hours per day, for thirty days, and the wager was won, but only by having doctors on hand during the end of the siege to massage the almost worn-out wrist. And a million miles is as nothing in the journey we are to take.

How shall we make the journey? We must make it in spirit; even though we fly "on the wings of the morning," and make the light ray our engineer, flying 186,000 miles in every second of time, it will take us thousands of years to reach our destination. As the light ray would take us from the earth to the sun in about eight minutes, this may bring home to you the distance we must travel. As children we used to read of the old-time magic, of the magic carpet that one could stand on, and be transported in a twinkling hundreds of miles, wherever one wished. But the modern magic of the telescope and the photographic plate is so much more wonderful that it makes the old fairy tale magic seem a very poor and ordinary thing. And all this brings me to the way we shall count our distances on this journey we are taking; to the foot-rule we shall use in considering the distances of the stars. A measure of a million or a billion miles would be too small; if we used such a yard stick with the stars it would be like trying to measure the mileage of the Pennsylvania system with a foot rule. So the foot-rule that astronomers use in speaking of the distances of the stars is something much greater, and yet easily understandable. Take light, which goes 186,000 miles in a second, that is, nearly eight times around the earth per second, and figure out how far light would travel at this rate in one year. It comes out that light travels nearly six trillion miles per year (six followed by twelve ciphers). This is our yard stick for stellar distances, and we call it the light-year. If a star is one of our near neighbors and only one hundred light-years away, this means that it would take light one hundred years to make the journey from that star to our earth. So I shall use the word light-year rather often in my talk tonight, and I shall try to make it about the only really technical term I use.

(From this point on, numerous photographs of the stars and heavenly bodies were thrown on the screen, with accompanying descriptive comment).

We naturally start our journey from the Allegheny Observatory, over on the North Side. Our main scientific work there is determining the distances of the stars by photography, and in this particular line of work we lead the world, having determined to date the distances of about as many stars as all the rest of the world put together. We are a department of the University of Pittsburgh; we have a small endowment, which ought to be larger, and which produces about half of our running expenses; the rest comes from the University. From April till December we have many evenings when the public are admitted to look through one of our telescopes; last year we had over 7,500 visitors on these public evenings. You must have tickets to get in on these evenings, but they are free, and we use the ticket system simply so that we may not be swamped. Make up a party, phone for a reservation, and come out and visit us this summer.

We must pass rapidly by our brother and sister planets of our solar system, which, like the earth, are going around the sun. They are only a few hundred million miles away; still in the "yards" so to speak, of the terminal we are leaving.

We will stop a moment, however, to look at our sun, and we do this because modern astronomy has taught us one very important thing about the stars, which is about the only thought I would like to "get across" and leave with you tonight. And this is the point: This sun of ours is really our nearest star. Here are the two ways of putting it which we ought to remember;—1st, our sun is a star, and 2nd, *every star is a sun.* This star of ours, from which we get all the life, light, heat, and energy on this little earth, for all that it is so important to us, and for all that it is more than 850,000 miles in diameter, is simply an average star. There are many stars brighter and somewhat larger, there are also many stars which are fainter, but modern astronomy teaches us that it is a good sample star, and that any star we see is pretty likely to be about the same as our sun in size, brightness, etc. We shall come back to this truth later in our talk. Leaving our sun and its little attendant earth and planets far behind, we are now ready to open the throttle and make a real start on our journey. We shall have a clear track, for though there are a billion stars in our Milky Way, it has been calculated that we could pass through it from side to side eight million times before we would, by chance, strike one of them.

There are probably none of us who have not at some time looked up at the stars and wondered how many of them there are, what they are, what we know about their distances and arrangement, what part we have in the whole, and what it all means, anyway. There is not much use trying to see the stars when we are surrounded by the lights of a large city, but some time when you are far away from such lights, perhaps when camping out in the summer time, take a good look at the sky above you. You will see a great many stars; not so many as you think, however, for the naked eye can see but about three thousand stars at any one time of the night. Try to remember that each of these points of light is a sun. Then, if the night is clear, you will have no difficulty in seeing a faint, broad band of light going across the sky, not very regular but very sharply defined.

We call this band of light the Milky Way; we belong to it;

A photograph of a part of the Milky Way. There are perhaps half a million suns shown in this picture. They are so far away that it has taken light about ten thousand years to make the journey. If Col. Maxfield would provide the motive power, and give us a sixty-mile per hour limited for the journey, with no time out for stops, grades, fuel or water, it would take just one hundred billion years before that train would be reported "in" at the other end.

what is its shape and of what is it made? It looks merely like a faint band of light to the eye, but when we look at it with a telescope we see at once that it is made up of countless thousands of stars, which the eye does not see separately because these stars which form the Milky Way are too faint to be seen as separate points; we get only the general effect of the whole as we look at it with the naked eye.

A photograph made of a part of the Milky Way shows still more clearly that it is composed of a vast multitude of stars. Now astronomers have made counts of the average number of stars at different parts of the sky; they know something of the distance of the average star; so by combining all we have found out on these points we find that we know this about the Milky Way.

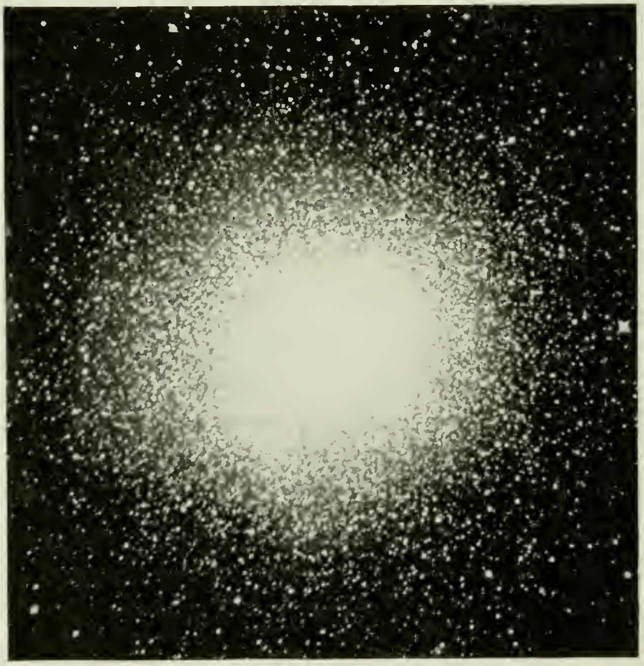
1. The Milky Way, or our own particular stellar Universe, contains certainly a billion, and perhaps two or three billion suns; we call these suns stars. The distance from any one star to its nearest neighbor will average 10 to 50 light-years.

2. They are not arranged haphazard, but there is a rough sort of system in the whole structure. We find that the Milky Way is a flat sort of structure, roughly round, considerably wider than it is thick. A thin pocket watch, or a reading glass, gives a good idea of the shape of the space which contains these billion stars. Our own sun, which is simply one of the stars of the Milky Way, happens to be located pretty near the center of the whole thing. So it is that when we look out sideways, so to speak, through the bigger dimension of this Milky Way, there are so many stars in that direction that we see a faint band of light across the sky; when we look out from it through the thinner way, we see not nearly so many stars.

3. Next, how big is this watch-shaped Milky Way of ours? I have said that it contains a billion or so suns; how large is this reading-glass space which contains these billion stars? Here astronomers differ somewhat. The more conservative idea, which is probably somewwhere near correct, is that this watch-shaped Milky Way is about 3,000 light-years through the thin way, and 30,000 or more light-years across the thicker way.

4. In this space we find all the stars, all the examples of that sort of cloudy, filmy stuff which we call nebula (from the Latin word for "cloud"), in fact, all the really very few sorts of things that we may see from our car window as we make this long journey. There is only one sort of thing that seems always to lie outside this Milky Way space, and these are a very remarkable and beautiful class of objects which we call the spirals. Many astronomers think that our Milky Way is itself a spiral in form, and that when we see one of these wonderful spirals, sometimes called spiral nebulae, we are really looking at *another Milky Way*. That is surely a brain staggering thought!

Let us now look at a beautiful star-cluster, where we see perhaps a hundred thousand suns collected in one great "pop-corn ball" or "diamond sun-burst," or at a photograph of a small part of the Milky Way, and try to bring home to our-



A beautiful star cluster, containing perhaps one hundred thousand suns. It is probably about ten thousand light-years away from us.

selves, as well as our confused brains will permit, the wonder of it all and what we really are looking at.

In this picture of the Milky Way shown on the screen before you now, I can not tell you just how many stars you are seeing in this one photograph, but probably at least half a million, maybe more. It is only a small part of the Milky Way, but it would take light a thousand or so years to go from one side of the screen to the other. Try to realize, if you can, that each one of these little points of light is a sun, maybe like our own sun and over three-quarters of a million miles through. How far away are the suns you see in this picture? Pretty certainly most of them are ten thousand light-years away.

Now what does it mean when I say that the stars of this picture are ten thousand light years away? It means that the light which made the picture started on its long journey to us five or six thousand years before Abraham's time, and has been coming across space toward us at 186,000 miles per second ever since. It means that we see this part of the Milky Way, not as it was on the night the photograph was taken, but the way it was ten thousand years ago. It means that should some tremendous catastrophe destroy the stars we see in this picture tonight, we would not know of it for ten thousand years. Also, it makes us really ten thousand years old, doesn't it, when we look at something the way it was ten thousand years ago? And we could go farther, if the journey we have taken seems too short. For, if the spirals are other Milky Ways, the light from them may have been on the road anywhere from half a million to ten million years!

Modern magic! As children we used to read of Aladdin and his wonderful lamp; how when he rubbed that lamp a djinn appeared who would do anything the owner of the lamp requested. What helpless any puny magic that was compared to that we are seeing before us! Ten thousand years ago some light started from these stars; we call it light, though we don't quite know yet what it really is. It is a something that moves in waves, very, very rapidly, so that there are five or six hundred trillion waves or vibrations in each second of time. Across all this space these vibrations, unchanged, have been coming toward us for ten thousand years. At last they reach us, enter our telescope, and beat for a few hours on the silver

A beautiful spiral. Our Milky Way is perhaps shaped like one of these spirals, round, flat, and thin, perhaps 30,000 light-years across. Many astronomers think that when we look at such a spiral we are really looking at another "Milky Way," made up, like our own, of perhaps a billion stars, but so far away that we can not see the separate stars This may then be 500,000 light-years away from us.

grains imprisoned in the emulsion of our photographic plate. They do something, just what we don't know, to those silver grains; we develop the picture, and find the portrait of a half million suns as they were ten thousand years ago. Modern magic!

I said earlier that our sun was an average star. Let us follow out that thought as we look at a picture of the Milky Way. Those little points of light are all suns. How much do we amount to? Well, how much difference will it make to those half million stars if I add one more? How much if I should destroy or take away one sun of that half million? Just one little point of light less, that will be all the difference if we take away a sun, perhaps with its attendant planets. If our sun were destroyed, and our earth, with its two billion or so people on it, it would make very little difference to the Milky Way we have been looking at. We do not amount to much! A cat may look at a king, runs the old proverb. It is that way with us as we look at such a picture. We, who are merely individual units of the two billion souls we call men, mere microbes, floating in space on a dust speck we call the earth, can look out at a very wonderful universe of stars.

Now let me sum up what we know of the shape and size of the Milky Way by a sort of "cross-section" of it.

"Cross-section" of the Milky Way.

500,000 spirals
in this direction.

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Our Milky Way and
stellar universe is shaped much
like a thin pocket watch, or a reading glass.
It is about 3,000 light-years in thickness and 30,000 or
more light-years in diameter. Our sun is situated just about at
the middle of this watch-shaped space. This space contains all
the stars of our Milky Way, one or two billion in
number, all the new stars, all the nebulae, in
short all of everything except,—
there are no spirals.

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500,000 spirals
in this direction.

Perhaps the question is arising in the minds of many of you, if there are a billion or so suns in our stellar universe, what about the planets going around them; are there any planets out there like our earth; is there intelligent life in other places in this mighty universe? We do not know; you can argue on that question just as well as I, for neither of us have a shred of evidence one way or the other. Planets are such small things, compared with suns, that no telescope can show a planet like our earth going round even the nearest of the stars. All we can say is that *perhaps* there may be such planets, but we do not know. And as to intelligent life elsewhere, we can't say, since we can not be sure even that there are other planets about these stars. *Perhaps,* with so many suns to pick from, there may exist numerous planets and on some of these planets, *perhaps* there are conditions of light, warmth, moisture, etc., which would allow of the existence of life as we know it. That is one side of our guess. But then again, life is a very wonderful and complex thing. It may be that such intelligent beings as ourselves are alone in this great universe, and that there is nothing like us anywhere else. No one can tell; as I said before, your arguments on that point, or better, your guesses, are just exactly as good as my guesses.

And now I come to my close with the questions: What good is it all; and, what does it all mean? I shall not need to answer the first one. Knowledge of the size and structure of our wonderful universe has not a single thing to do with, or the least effect upon, ton-mile costs. But we know that, like a fine painting or a beautiful song, such knowledge makes us men of bigger, finer, and happier souls.

What does it mean? It may mean many things to us, but there is one thought I would like to leave with you. If I were a member of some great corporation, say the U. S. Steel Corporation, I am inclined to think that I should pride myself on that fact, should feel that I was a co-worker, a helper, in a great and useful industry. I would be proud that I was a member of a big firm. So it is with our knowledge of the mightiness of the universe of which we form so insignificant a part. We don't quite know what it all means, yet, but one thing is certain,—*we are all members of a mighty big firm*, a tremendous firm, and most of us think that there *must* be a God at the head of it.

(Note—The address of Dr. Curtis as printed is incomplete as the talk was liberally illustrated with lantern slides, etc., making it impossible to reproduce in full.)

VICE PRESIDENT: We will be very glad to have anyone ask questions that may occur, either in the way of a further explanation of what the speaker may have said or a further development of the subject.

MR. A. E. ANDERSON: Speaking of that picture with the 86,000 suns in it, as the result of your observations of the last twenty or twenty-five years, have you noticed any change in the location of the suns or any movements that showed circulation?

DR. H. D. CURTIS: Not circulation in the larger sense. Every one of these suns in the Milky Way is moving and at pretty rapid rates. I could give a whole evening just to the movements of the stars. To illustrate by the movement of our own sun, we do see a little movement if we take a plate now and another fifteen years from now and compare them. The shift amounts to very little, however, only perhaps a few seconds of arc at most. In the case of our sun it amounts to about 13 miles per second. The sun and the earth and the planets going around the sun are shooting through space probably 13 miles a second—not thirteen miles an hour but thirteen miles a second. That is rather a slow coach as stars go. Some of them are going 100 and 200 miles a second. If I should talk ten minutes too long tonight I would be about 6,000 miles beyond the corner where I ought to have gotten off. Every star is moving at a high rate of speed; our sun an average of very close to 13 miles a second. We know the direction it is going but long before it gets to that part of the sky, attractions will curve it a little to one side or another but it will take not ten or a hundred but a thousand years before we know all the facts of that revolution.

MR. HENRY F. GILG: What kind of photographic plates do you use in astronomical photography?

DR. H. D. CURTIS: The fastest plate we can get. If someone would invent a plate ten times faster than the present plate or a hundred times faster, we could multiply all our work by that. We use a Seed 30 which is about the fastest plate made. For some of the brighter things we use a little slower plate; but a faster plate would be a great thing for us. It would mean that instead of having to expose a plate three or four hours we might expose it only ten minutes.

VICE PRESIDENT: Dr. Curtis a comparatively newcomer in Pittsburgh. I am sure we are all delighted to have him with us. He is a very worthy successor to our beloved Uncle John Brashear. We are all very deeply indebted to Dr. Curtis for his most interesting address tonight and the illustrations.

MR. SION B. SMITH: If I may be pardoned the remark, Dr. Curtis is in at least one respect quitely closely related to the late Dr. Brashear, our honored friend, and, I believe, an honorary member of this Club. At the time of the earthquake in San Francisco, Dr. Brashear gave a popular talk on astronomy out in Carnegie Hall for the benefit of the earthquake sufferers. He used to tell with great glee of a conversation he overheard on the street car on his way home from the lecture, between a man who had evidently heard the lecture and his friend whom he was telling about it. Neither of them recognized Dr. Brashear. This man said to his friend, "I tell you, that man is either the wisest man or the biggest liar in the United States."

MR. RANK J. LANAHAN: Since Mr. Smith has broken the ice and brought us all suddenly back to earth from our journey heavenward, I am yielding to the temptation to state that as I listened to the very eloquent and learned words by the gifted gentleman upon a subject almost beyond human comprehension and heard frequent reference to the limitless time of the travelling of sunlight from these far distant planets, there came to my mind the irrelevant story of the darky who was up before the Magistrate charged with the offense of appropriating a hen from its roost in the dark of the moon without the formality of the owner's consent. A sentence had been imposed on the culprit of spending six months in jail and to the query of the Court as to having anything to say, replied, "Well Judge, you surely am most liberal with other people's time."

VICE PRESIDENT: Are there any other questions? We have all been impressed with the smallness of our existence tonight. We used to think it was a long way to McKees Rocks, but it does not seem to cut much figure in the distances Dr. Curtis has been telling us about.

MR. FRANK J. LANAHAN: As the President has made mention of that important and thoroughly classical place from which the majority of us here tonight hail, McKees Rocks, it would seem appropriate, as the head of the Observatory has referred to all the other stars in the stellar universe, to have a word of appreciation from a resident of McKees Rocks, conveying to him how very grateful we all feel for his delightful, instructive and very educational discourse to us this evening and to make known to him at the same time, the fond memories we have of his predecessor, Dr. Brashear. Time after time did that fine gentleman and scholar address our Club and always left a thankfulness that we heard him and gladness that we knew him. If for no other reasoon than this, we are grateful to have as our speaker tonight, the successor of Uncle John. We are indebted to Dr. Curtis for the service he has rendered to us tonight and we hope he will come and visit us often. I move, Mr. Chairman, in behalf of the Railway Club of Pittsburgh, that a rising vote of thanks be tendered to Dr. Curtis for his courtesy.

The motion prevailed unanimously by all members rising.

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

In Memoriam

W. K. Steele

(Date of death unknown)

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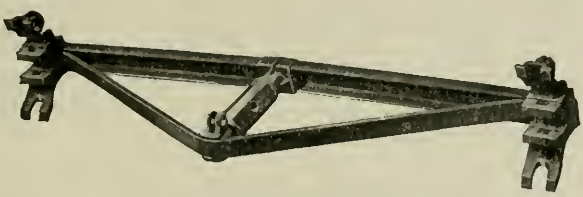

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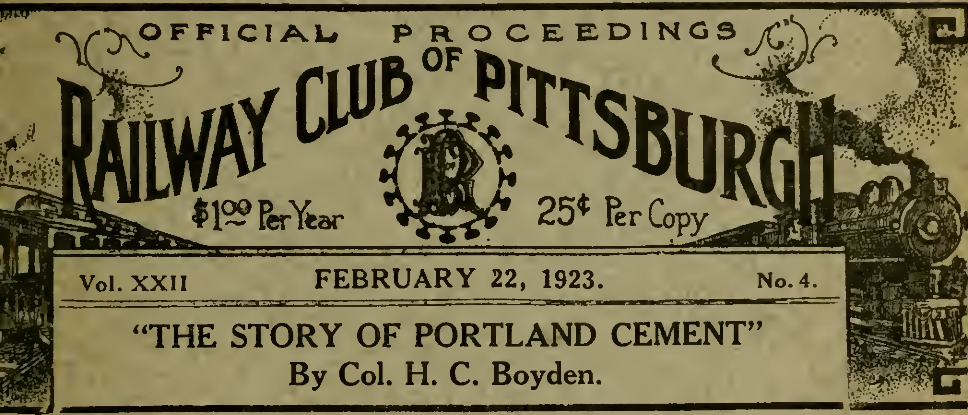

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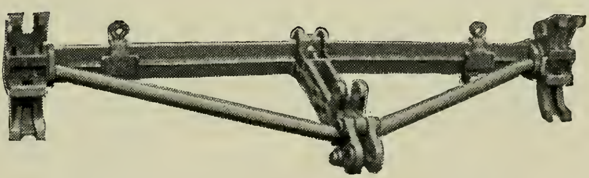

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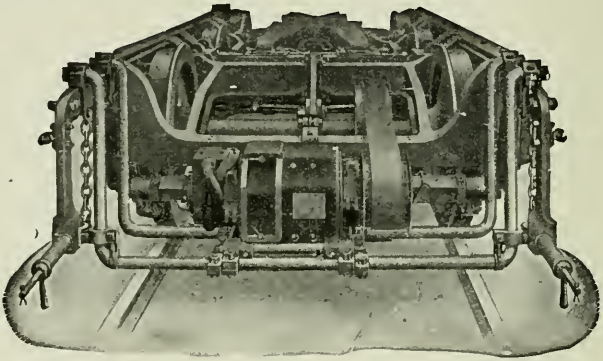

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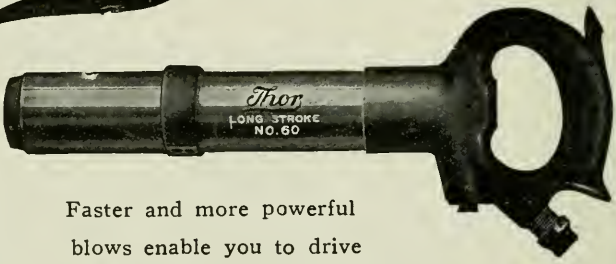

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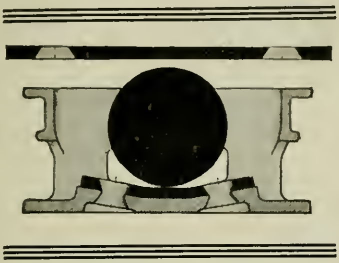

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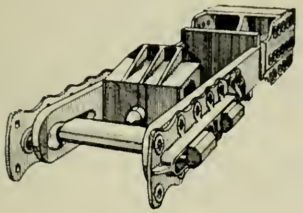

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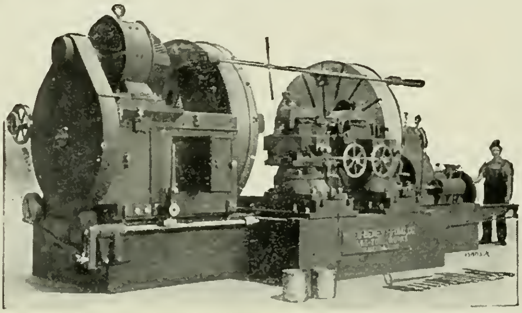

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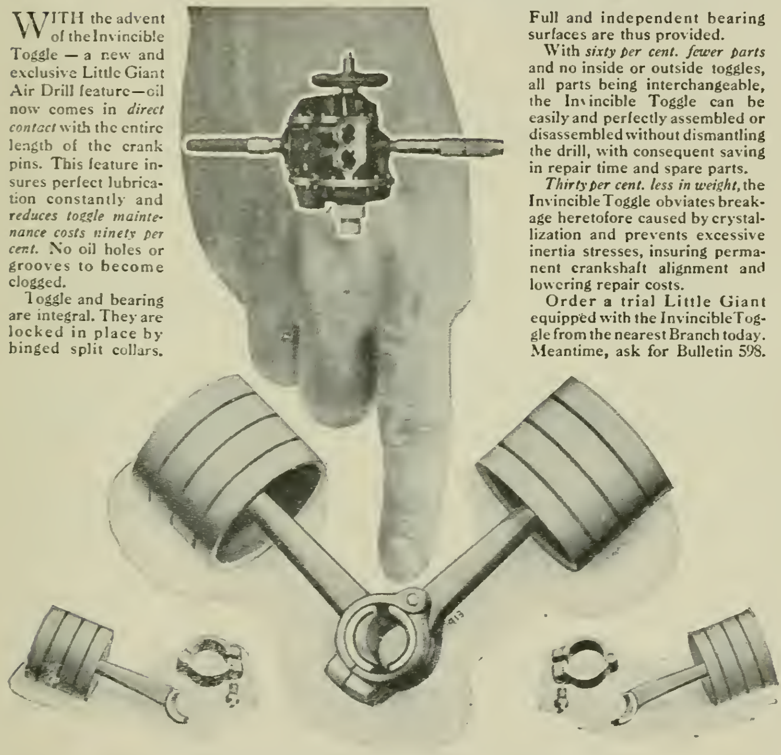

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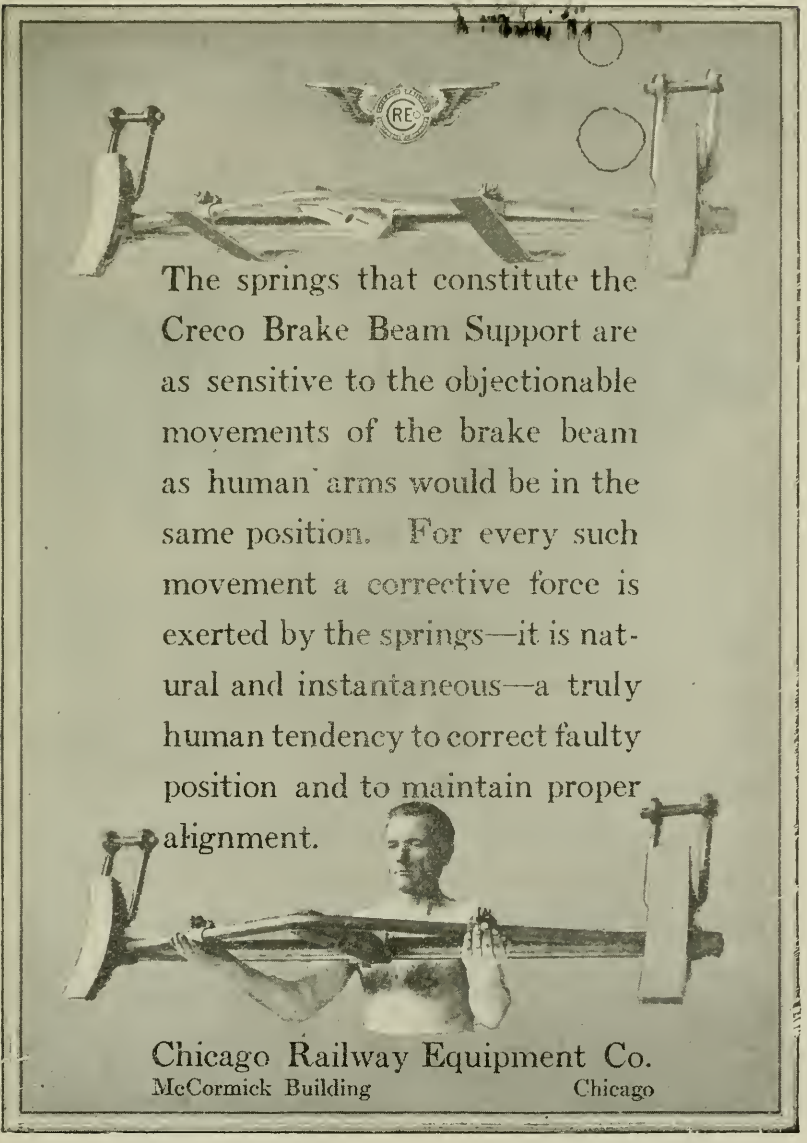

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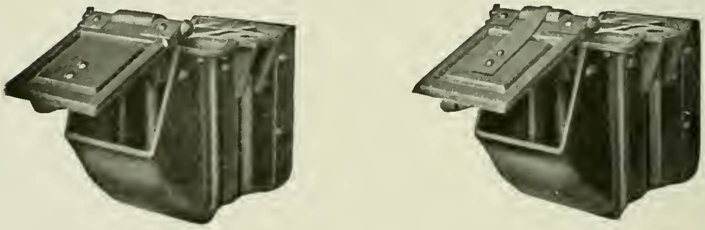

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No. 4
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*—Deceased.

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February 22, 1923

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Moyer, Oscar G. A.
McBroom, J. F.
McKirahan, J. R.
McNulty, F. M.
Orchard, Chas.
Passino, F. J.
Pehrson, Alf. K.
Price, W. T.
Ralston, J. A.
Rauschart, E. A.
Reynolds, D. E.
Ritts, W. H.
Robbins, F. S.
St. Clair, Chas. B.
Severn, A. B.
Shultz, Geo. J.
Stucki, A.
Van Vranken, S. E.
Willoughby, F. R.
Winell, K. O.
Wright, John B.
Zilian, R. F.

VISITORS

Blossom, H. F.
Boyden, Col. H. C.
Carbi, N.
Carothers, Chas. A.
Clopton, E. J.
Cunningham, W. P.
Dilley, J. M.
Gority, H. E.
Jex, W. F.
Johnson, Edw. H.
Jones, Percy
Jungbluth, H. A.
Ludwig, C. F.
Mahan, W. C.
Moody, E. H.
New, C. W.
Ralph, W. E.
Sarver, G.
Sheasley, R. A.
Smith, Sion B.
Thomas, Wm.
White, W. W.
Wibner, A. J.
Wilhelm, Clinton R.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Adams, Clifford M., Asst. Storekeeper, Penna System, 908 Center St., Wilkinsburg, Pa. Recommended by H. G. Huber.

Armstrong, J. B., Brown & Co., Inc., 26 Tenth St., Pittsburgh, Pa. Recommended by J. D. Conway.

Baldwin, S. Y., Gen. Agent, Delaware & Hudson Co., Bessemer Bldg., Pittsburgh, Pa. Recommended by J. D. Conway.

Hallenbeck, H. W., Rep., Forged Steel Wheel Co., 1120 Frick Bldg., Pittsburgh, Pa. Recommended by J. F. Courson.

Hess, L. H., Loco. Engr., P. & L. E. R. R., Box 272, Roscoe, Pa. Recommended by Sam A. Damore.

Nevill, Joseph, Asst. Engr. Corps, Penna System, 1013 Penn Ave., Room 601, Pittsburgh, Pa. Recommended by W. J. Murphy.

Passmore, H. E., Salesman, Grip Nut Company, 1821 Bryden Road, Columbus, O. Recommended by C. W. Alleman.

Ralph, W. E., Car Inspector, P. & L. E. R. R., 934 Fifth Ave., Coraopolis, Pa. Recommended by E. S. Harger.

Rank, G. G., Delivery Clerk, Purch. Dept., Penna System, 14 Walnut St., Crafton, Pittsburgh, Pa. Recommended by J. J. Kasnitz.

Tuttle, C. L., Mech. Engr., B. & L. E. R. R., 223 East Ave., Greenville, Pa. Recommended by J. A. Ralston.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

Announcment was made of the deaths of Mr. James F. Christley, Monongahela Connecting Railroad Co., died January 20, 1921; Mr. B. S. Hammill, B. S. Hammill Company, died February 13, 1922; Mr. L. P. Lincoln, Superintendent Structural Department, Carnegie Steel Co., died October 19, 1922; Mr. George F. Harris, Chief Car Distributor, B. R. & P. Railway, date of death not known.

PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

If there is no further business we will take up the paper of the evening. We have all gotten in the habit of saying, "Make it of concrete." The use of concrete is extending. As we go along our public highways we find numerous concrete structures for many uses. The basis of concrete is, of course, cement. One of the things that we as railroad people have to do is to broaden our knowledge of the materials that enter into the construction of the various structures used by railroads, as well as the materials used in the rolling stock. Our Railway Clubs have quite generally devoted their attention to the rolling stock to the exclusion of other structures. It is a great privilege, therefore, to have with us tonight a man who can tell us a great deal about Portland Cement, the basis of concrete, Mr. H. C. Boyden, Engineer of the Portland Cement Association, of Chicago, Ill.

"THE STORY OF PORTLAND CEMENT"

By Col. H. C. Boyden.

COL. H. C. BOYDEN: Mr. President and Gentlemen:--One of the most difficult tasks that confronts any speaker is to speak to a mixed audience. It is especially difficult to present a technical subject to a mixed audience of technical and non-technical men. If to some of you, parts of my talk are too technical, while to some of you parts of my talk are too non-technical, I hope you will forgive me.

I am going to talk on two subjects, cement and concrete. Before I take up my subject, I would like to take a few minutes and give you some idea of the organization which I represent. The Portland Cement Association is an organization, composed of and supported by, the cement manufacturers of the North American continent. There are represented in the Association, the manufacturers of 95% of all the Portland cement that is made on the continent. The Association is not, however, in any sense a selling organization. It has absolutely nothing to do with the sale or the price of Portland cement. It is a scientific organization, maintained and supported for the purpose of extending the use of concrete wherever that material may be adaptable, but largely for improving the quality of the material. The Association functions through two agencies; first, a central headquarters in Chicago, to which I have the honor to be attached, and then twenty-five district offices, which are scattered throughout the United States, one of them being in your own city. In Chicago is handled the policies of the national association, the advertising and publications, amounting each year to between two and three million pieces, and there are answered literally hundreds of thousands of inquiries that come in to us, not only from the North American continent, but from all over the civilized world.

Whenever a letter of inquiry comes to the Chicago office, it is turned over to a man who is not only a concrete specialist, but who is a specialist along the particular line that is inquired about in the letter. That man has spent years, and in many cases all of his professional life on one particular phase of concrete making, which may be highway construction, cement products, building construction, or railroad work. He has at his back a national organization with sources of information everywhere, and he also has at his service the largest and the most complete library on the subject of concrete that exists in the world today.

The organization has nothing to sell. It has something to give. It is a service organization and it is at your service. Bring to us and to our representatives wherever you may find them, any problem that relates to concrete, whether it be in your personal, your business or your civic life, and we will freely and cheerfully give you the best information obtainable.

I wonder how many of you know what Portland cement is. When, not quite four years ago, I was asked to talk on this subject I said I did not believe that was necessary, because Portland cement is such a common product and so widely used that surely everybody must know what it was. They asked me if I knew what it was. Having been a construction engineer for nearly a quarter of a century, and having used hundreds of thousands of barrels of it in my work, I thought I knew what it was. But when I came to sit down and attempt to describe it I found that I could not do it. So I made up my mind that there must be others, who had not the same reason for knowing that I had, who did not know what Portland cement really is.

The first thing I did was to look up the definition. I found it a very simple one. Portland cement is the product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials, without the addition of anything subsequent to calcination, except water and calcined or uncalcined gypsum. Isn't that simple? Now you all know just as much about Portland cement as I do.

Let me translate that, however, for fear some of you may not quite grasp all of it. Limestone or some other similar material is mixed in very careful and intimate proportions, the proportions varying each day according to a chemical analysis of the particular raw materials at hand, with shale, clay or slag. The mixture is ground to a very fine powder and then passed into the upper end of rotating steel cylinders.

These cylinders in the average plant are about 8′ in diameter and 140′ long. The cylinders are pitched about ¾″ to the foot and revolve through ¾ of a full revolution per minute. As they revolve the powder slowly works toward the lower end, requiring between two and three hours. At the lower end there is a flame provided with pulverized coal, producing a temperature of approximately 2,500° to 3,000° F.

As the powder reaches this hot area it becomes calcined or roasted into a clinker, varying in size from the end of my little finger to 1½″ or 2″ in diameter. This clinker is drawn off in a red hot condition, cooled and partially ground again to about ¼″ in size. In that condition there is added to it, not to exceed 3% of powdered gypsum. The gypsum is added simply to control the time of setting.

If the clinker were ground to a powder it would set or harden so quickly when combined with water that you could not use it. Gypsum has the same characteristics. It is a peculiarity of a chemical combination that the mixing of two quick setting powders produces a slow setting powder, therefore the gypsum is added simply to control the time of setting.

After the addition of the gypsum the material is again ground into the fine, impalpable powder which you all know as Portland cement. So fine is this powder that, according to the specifications, 78% must be able to pass through a sieve similar to that which I have in my hand. That sieve will hold water. In that little piece 3″x5″ there are 600,000 holes, or 40,000 holes to each square inch. The finest piece of silk goods which could be bought in the market was tested and found to have a little over 35,000 holes to the square inch, but there are 40,000 to the square inch in that sieve.

Portland cement is not called that because it is made in Portland, Me., or Portland, Ore. Portland cement is called that simply because when the first patent for the process of manufacturing it was taken out, in 1824, by Joseph Apsden, a brick layer of Leeds, England, he called it Portland cement. He called it that simply because when it was hardened, it resembled in color a very fine building stone, only found on the Isle of Portland, lying off the south coast of England. So that any cement, no matter by whom manufactured, no matter by what name it is sold or where it is manufactured, if manufactured by this process is a Portland cement.

Only forty years ago there were manufactured in this country approximately 40,000 barrels in one year. Today one member company alone has a capacity in its plant of 40,000 barrels each day in the year. Last year, 1922, there were manufactured, sold and used in this country approximately 116,500,000 barrels of Portland cement.

That does not mean very much to any one unless he can visualize it in some form with which he is familiar. Suppose we take the output of the plants last year and make it into a concrete of a good quality and then make that concrete into a road 18′ wide and 8″ thick. We would have a road that would reach ten times across the continent, from New York to San Francisco. Let us make it into houses, which are so badly needed today, and we would have enough to make 1,200,000 six room houses, concrete from the cellar to the roof, with a porch and a sidewalk thrown in.

Let us make it into reproductions of the greatest single structure ever created by the hand of man, the great pyramid of Egypt, a structure which tradition says took 100,000 men 40 years to build. We would have sufficient concrete to make 27 reproductions of that great pyramid, and it would make those reproductions solid, which the great pyramid itself is not. Or let us make it into sidewalk, with which all of us are familiar, and we would have enough concrete to make a sidewalk 5′ wide and 4″ thick that would reach from here to the moon.

I have given you these few rough figures to give you some idea of the extent of the industry, also to give you some idea of the extent to which concrete is entering into our lives. You are all transportation men, as I understand your organization, and one of the greatest problems in the production of this immense amount of Portland cement is the transportation of the raw materials to the plant and of the finished product to the ultimate consumer.

The capacity of the cement plants in the country is approximately 116,000,000 barrels of Portland cement each year. Last year there was sold over 116,000,000 barrels; the year before approximately 100,000,000, and with every prospect of a similar increase this year, there may be a great deal of difficulty getting that immense amount of material away from the plants and to the ultimate consumer.

There may be statements made that there is a shortage of cement this year. It is not believed there will be a demand beyond the capacity of the plants to manufacture, but there will undoubtedly be many times when the transportation facilities will not be sufficient to move the material away from the plants and to the places where it is to be used. Of course you understand the maximum demand will come during the warm season of the year.

To return to concrete, which is a product of which cement is only one ingredient, it may be said that there is not a man, woman or child who lives in a city, and a surprising few who live in the country, who does not, at some time in the day, each day in the year, come in contact with concrete in some form or other.

It may be just the floor in the cellar or in the garage, a walk around the house, a sidewalk in front of the house, the street over which they go to work, the building in which they work, the schoolhouse where the children go to school, the church they don't go to on Sunday or the road on which they do drive on Sunday; somewhere they come in contact with concrete.

In 1922 the people of this country paid approximately $1,200,000,000 for concrete in its various forms. All of that concrete was not of the best quality that it could have been. I do not mean by this, that it was not good concrete, but that there was room for improvement. In fact I may say without fear of contradiction from those who know, that had all that concrete been scientifically designed, placed and protected, it would have been increased in value at least one-third and possibly one-half.

What does that mean in dollars and cents? It means that each year there will be a possibility of adding from $100,000,000 to $600,000,000 of permanent value in the making of just one product in our construction program.

Whose fault is that? You ask the engineer, he will say the contractor. You ask the architect, he will say the contractor. You ask the contractor, he will say the engineer and the architect. You ask the owner and he will say many things. Possibly they are all right, because it has only been in recent years that we have known how to develop all the strength in concrete.

About nine years ago, in 1914 to be exact, the officials of the Association, realizing that no one knew the fundamental laws that must be observed to get all the value in the making of concrete, and realizing that the expansion of the industry was dependent upon the finding of those laws, decided to establish a laboratory for the purpose of establishing them.

They established this laboratory at the Lewis Institute, an Engineering College in Chicago. They made a very careful search in order to find the right man to do the work in this laboratory and they made what turned out to be a most fortunate choice. Professor Duff A. Abrams, a graduate of the University of Illinois, an able investigator at that time, was placed at the head of the laboratory. Professor Abrams was given ample money, so that, no matter how long an investigation is going to take, no matter how expensive an investigation is going to be, if it is worthy of making at all, there will be sufficient funds to carry that investigation to a point where the answer is absolutely indisputable.

That laboratory is in operation today, making tests at the rate of approximately 75,000 a year, with 35 or 40 men working constantly in it. If you analyze that you will find it means one test every two minutes, 8 hours a day, 300 days in the year. The laboratory operated for five years under these ideal conditions before a report was published.

When that first report came out at the end of five years—not quite four years ago now, in April, 1919—it brought out facts, not theories, every one of them proved, not with hundreds, but literally with tens of thousands, and in many cases hundreds of thousands of tests.

Those facts were radical, and completely reversed the ideas of many of our construction engineers as to how to make concrete. If the facts brought out by the laboratory are fully followed—and they are at the service of any man who wishes them—and the concrete is properly made, there are many times when twice the value that is being obtained today will be the result.

The common idea regarding concrete is, that you can take the four ingredients, cement, sand, stone and water, and then by doing certain things to those ingredients you can put concrete making ability into them. That idea is wrong. When you have once chosen your ingredients and brought them on the job, you have in your possession a certain amount of concrete making ability and nothing that you can do to those ingredients is going to put anything of value into them. It does depend, however, entirely on what you do to those ingredients as to whether you will develop 10% or 50% or 100% of such concrete making ability as is inherent in those particular ingredients.

GENERAL

The study of concrete may be conveniently divided into three phases:

1. The study of the characteristics of the ingredients.
2. The study of the effect of making various combinations of these ingredients.
3. The study of the effect of the various manipulations of the ingredients in making and curing concrete.

This paper will touch on only those investigations that have brought out essential changes in previous ideas of the subject or that have confirmed those ideas beyond a doubt.

It has been the custom to speak of concrete as having three ingredients, cement, fine aggregate and coarse aggregate. The laboratory studies have shown the desirability of classifying the ingredients as cement, aggregate and water, or if it is still desired to maintain the purely arbitrary division of the aggregate into fine and coarse, to add the fourth ingredient, water.

Although cement is one of the most important ingredients of concrete, it requires probably the least discussion, as all the standard brands of Portland Cement on the market today conform to generally accepted specifications and laboratory investigations have brought out no essential need for changes in these specifications.

As stated above, the aggregate has always been divided into two parts, sand, and crushed stone or pebbles. The line of division, purely an arbitrary one, is the quarter-inch screen, the portion passing through this screen being classified as fine aggregate or sand, and the portion retained on this screen being called the coarse aggregate. There is no particular advantage gained by this division but it would be much better to consider the aggregate as a whole, with a proper graduation of the various sizes from the largest to the smallest. It is not intended by this, however, to recommend the use of bank run or crusher run aggregate, as under no conditions should they be used without separating the sizes and recombining in the proper proportions.

However, until such time as this method of considering the aggregate shall have become of general practice we will consider it as being divided into two parts by the ¼" or No. 4 screen, and will so discuss it.

FINE AGGREGATE

It is customary to specify that the fine aggregates shall be clean, sharp and not too fine. It would be better to omit the word "sharp," because rounded particles find their way into place more readily than do sharp ones, and require less water to produce a workable mixture. It is this lowering of the relative quantity of water used that causes the greater compressive strength found in concrete made with smooth, rounded sand. It would be well to insert the word "hard" because that quality is very desirable.

The laboratory studies have brought out two important facts regarding sands. One of these is the great importance of being sure that the material is clean, not only in appearance but in fact. Very often sand which appears to the eye to be clean, contains enough humus or vegetable matter to reduce the strength very considerably.

As an illustration, a clean sand gave a compressive strength at 28 days of 1,900 pounds. This same sand with one-tenth of one per cent of tannic acid added, gave a strength of only 1,400 pounds; in other words, one thousandth part of organic impurities in terms of the weight of the sand reduced the strength of the concrete over 25 per cent. In the investigation of the effect of organic impurities many natural sands were used, but as it was not feasible to secure sands containing a wide variation of organic impurities, tannic acid was used as a substitute for the purpose of making further tests. It was felt that the effect produced by such a material would probably be a measure of the effect produced by other organic impurities which might be present in natural sand.

How can these organic impurities be detected if they cannot be seen by ordinary inspection? By using the colorimetric test for organic impurities which was devised at the laboratory. This test consists of digesting a representative sample of the sand in a dilute solution of sodium hydroxide (caustic soda—NaOH) and observing the resulting color of the liquid.

All that is needed is a 12 oz. prescription bottle and a little 3 per cent solution of caustic soda or sodium hydroxide, both obtainable at any drug store. Put in about 4½ ounces of the sand to be tested, fill up to the 7 ounce mark, after shaking, with the solution of caustic soda, let it stand for 24 hours and observe the liquid on top. If this liquid is clear or light straw colored use the sand; if it runs into the brown color and especially dark brown, reject the sand or wash it thoroughly before using.

The second fact brought out by the laboratory studies is that fine sand behaves exactly the same as coarse sand except in one particular. In order to produce a plastic, workable mixture with fine sand it is necessary to use more water than with a coarse sand. It is the excess of water that reduces the strength of the concrete. In other words if concrete could be mixed with the same quantity of water regardless of the grading of the sand, and a plastic mix obtained in both cases, the same strength would be secured in the concrete.

COARSE AGGREGATE

When studying the characteristics of coarse aggregate one conclusion has been brought out very sharply; namely that the hardness of the aggregate is a secondary consideration as compared with other factors, in developing high crushing strength in concrete, and of less importance than ordinarily supposed in developing ability to withstand abrasion. This was very clearly shown in comparative tests made by burnt shale for use in building concrete ships. Samples made with this aggregate compared very favorably with those made with a much harder aggregate. A stone must be very friable indeed if it is not strong enough, when properly combined in concrete, to more than maintain the load likely to be carried by the concrete.

The reason for the high compressive strength often secured where a light, soft aggregate is used, is because the porosity of the aggregate reduces the quantity of water available in the mixture. Here again the relative quantity of the mixing water is the governing factor.

For road surfaces, however, another quality is needed in concrete, namely, resistance to wear or abrasion, and to obtain this the stone must not be too soft. It is not advisable to use a stone with a French coefficient of less than 7 although pavements have given excellent results when made with stone having a coefficient as low as 6.

It is not intended in calling attention to the above results to advise throwing down the bars and allowing the use of any and all stones, irrespective of their hardness or wearing qualities. It is desired, however, to show that many of the safeguards that have been put into specifications in past years are not safeguards at all, and that the effect of following them may be entirely lost through neglect to obesrve other factors of more vital importance. It is always advisable to use the best materials obtainable; but there have been many cases when the local and easily obtainable material has been rejected, when it could have been used with excellent results, by following proper principles in proportioning and protecting the concrete; oftentimes better results would have been obtained than resulted from the use of imported materials and then neglecting the really important factors in making good concrete.

WATER

The remaining ingredient of concrete, water, is in reality of equal importance with the cement in obtaining good concrete, and yet it is often the most carelessly used and most loosely specified of all the ingredients, generally neglected in specifications and frequently not even reported in the published data of concrete tests.

The laboratory has conducted tests of waters sent in from all parts of the country, but definite conclusions have not as yet been published. It is safe to say, however, that waters which are strongly alkaline should not be used, and, owing to the possibility that marsh waters may contain sufficient humus matter to affect seriously the strength of concrete they should be looked upon with suspicion until tested in concrete and found satisfactory. A safe specification is to require that the mixing water shall be potable.

Regarding the temperature of the mixing water, tests have been made, using water ranging in temperature from 32 degrees to 212 degrees F. It was found that the temperature of the mixing water had very little to do with the strength of the concrete. The use of hot water is, however, a valuable aid in removing frost from the aggregate in cold weather, owing to its high specific heat, and may be used without danger of harming the concrete. Hot water tends to hasten the hardening of concrete.

PROPORTIONING

On studying the second phase of concrete making, there have been brought out at the laboratory, new, and in some ways radical changes in the past and present practices of proportioning.

These investigations have brought out the following facts, first, that the present method of designing concrete mixtures by using arbitrary volumes is wrong; second, that there is one single proportioning which will give the best results with a mixture of given fine and coarse aggregates; third, that adding to or reducing the amount of cement is of value only as it affects the relative quantity of water required to make a workable plastic mixture; and fourth, above all, that the water-ratio is the most important element of a concrete mix. The water-ratio as used by the laboratory, is the ratio of the volume of the water to the volume of cement in the batch. If 1 cu. ft.

of water (7.5 U. S. gals.) is used for each sack of cement, the water-ratio is called 1.00

The use of more cement in a batch does not produce any beneficial effect except from the fact that a plastic, workable mix can be produced with a lower water-ratio. The reason that a rich mixture gives a higher strength than a leaner one is not that more cement is used, but because the concrete can be mixed with a water-ratio which is relatively lower for the rich mixture than for the lean one. If advantage is not taken of this possibility of reducing the water-ratio the additional cement in the richer mixture is wasted.

FINENESS MODULUS

In studying the results of the tests of many samples of various combinations of aggregates it was evident that there must be some relation between the size and grading of the aggregates and the strength of the concrete. In trying to find this relation Professor Abrams struck upon what is called the "fineness modulus" of aggregates and when this was compared with the strengths of the concrete a direct relation was found to exist.

The fineness modulus is a very simple function of the sieve analysis of the aggregate used for any particular concrete. The aggregate is analyzed with a selected set of U. S. standard square mesh sieves, each one of which has a clear opening double the width of the next smaller. The following sizes are used: 100, 50, 30, 16, 8, 4, ⅜", ¾", 1½" and 3" The percentages (by volume or by weight) of the total aggregates coarser than each sieve are added together, the sum of these percentages is divided by 100, and the result is the finness modulus. The fineness modulus of any combination of the fine and coarse aggregates may be found in exactly the same manner. Aggregates of many different gradings may have the same fineness modulus; or in other words, aggregates of many different gradings may be used and still secure the same compressive strength in the concrete.

It is not claimed that this method of designing concrete mixtures is the only one that will give the desired results but the laboratory tests prove beyond a doubt that there is a direct relation between the compressive strength of concrete and the factor called the "fineness modulus." This is because the fineness modulus reflects the changes in the water-ratio necessary to produce a given plastic condition in concrete. Accepting this as a fact, it is possible to design a concrete mixture that will give a certain desired compressive strength from many different combinations of aggregates.

It is not possible in a paper of this length to go into the details of the use of this factor for the design of concrete mixtures, but they were published in the Engineering News-Record of April 17, 1919, and a careful study will enable one to use this factor successfully.

ABRAMS' TABLES OF PROPORTIONS AND QUANTITIES

In order to make these principles more easily available to engineers, architects, contractors and other users of concrete, Professor Abrams has worked out tables of the proportions and quantities required to produce concrete of compressive strength from 1,500 to 4,000 lbs. per square inch, at 28 days. All the tests for the determination of the factors in these tables were made of concretes of varying consistencies, formed into cylinders 6" by 12" in size and tested at the end of 28 days.

In conformity with present practice the aggregate is divided in the tables into fine and coarse, and covers combinations of five classes of fine aggregate with eleven classes of coarse aggregate.

Four different consistencies as indicated by the slumps of the concrete, are used for each combination so that there are 220 different combinations for each strength or 1,320 combinations in all.

The quantities shown in the tables are considerably less than those shown in any previously published table due to the fact that they are absolutely net quantities based on laboratory methods of measurements of the aggregate. FOR THIS REASON THE QUANTITIES GIVEN SHOULD NOT BE USED FOR ESTIMATING WITHOUT THE ADDITION OF PROPER ALLOWANCES FOR WASTE AND THE DIFFERENCES DUE TO THE PRACTICE OF MEASURING AGGREGATES IN A LOOSE CONDITION WHEN MAKING FIELD CONCRETE.

These allowances should vary for each ingredient and also according to the particular method to be employed in handling the work. For general conditions the following percentages to be added to the table quantities are offered as a suggestion: cement 2%, fine aggregate 10% and coarse aggregate 7½%.

WATER CONTENT

Upon studying the water content, the most radical change from previous ideas on the design of concrete mixtures is found. Based upon thousands of tests it has been established that there is a direct connection between the relative quantity of mixing water used and the strength of the concrete and there is probably no other one factor which has so great an effect upon the strength as the water content.

It has been found that the less water used, as long as the mixture is plastic, and the aggregate is not too coarse for the amount of cement used, the stronger will be the concrete. This does not mean that the amount of water can be reduced too far, nor that, in actual construction, it can be reduced to a point that would give the maximum strength shown in laboratory tests. There is another factor that must be taken into account in construction and that is the workability of the mix. In general terms it can be stated that the lowest water-ratio should be used that will give a workable mix.

Within the range of plastic mixtures, the strength falls off very quickly with the addition of a small amount of water; so much so that in a one bag batch the addition of one pint of water more than is necessary to give a workable mix produces the same loss in strength as if two or three pounds of cement had been left out. Do not think from this that a very lean mix with a small quantity of water will give as strong a concrete as a rich mix with the same quantity of water. This is not true, because it will require a higher water-ratio to produce a workable mix with the lean mixture, thereby causing a loss in strength.

The proper consistency for concrete will vary according to the use to be made of it. If the concrete is to be used for roads a dryer consistency is permissable than for concrete containing reinforcing bars. The use of mechanical tamping and finishing machines in concrete road construction has made it possible to use the dryer consistency economically, but any method which reduces the water content, such as the use of the light roller, will produce beneficial results.

The very wet sloppy mixtures that are being used in building construction may seem economical from the contractors' point of view but they are certainly extremely wasteful from the designers' and owners' point of view, since in many instances 50 to 60 per cent of the possible strength of the concrete is being thrown away.

It may not be possible to reduce the amount of the water to the ratio necessary to give the maximum strength, but it certainly can be cut down below the amount commonly used, and the additional strength thus gained will be of advantage in the design of concrete structures. The designing engineer figures on a compressive strength of 650 lbs. per sq. in. and expects to get a factor of safety of three, but does not get it with the sloppy mixtures often used. By cutting down the water to the proper ratio, a factor of safety of five or six can be secured, or the present allowable unit stresses can be raised.

The exact amount of water required for any particular mixture of aggregates to obtain the greatest strength in the concrete cannot be given, because of the impossibility of determining what amount will produce a workable mix and also because of the varying moisture content of the aggregate. However, a few approximate quantities for different proportions of well graded aggregates up to 1½ in. in size, may be given to form a basis for trial of the particular mixture at hand. A 1:2:4 mixture will require from 6 to 6½ gallons of water per sack of cement, a 1:2:3 mix, 5¾ to 6 gallons, and a 1:1½:3 mix, 5½ to 6 gallons.

SLUMP TEST

In order to have a simple method for determining the proper consistency in the field the slump test has been devised. At first a metal cylinder 6 inches in diameter and 12 inches high was used, but now a frustrum of a cone 4 in. in diameter at the top and 8 in. at the bottom, and 12 in. high has been adopted as a standard. This cone is filled with the concrete to be tested, which is carefully worked with a pointed metal rod while it is being placed, the form is immediately lifted off, and the settlement or slump measured. The proper slump for a mixture to be used for a concrete road surface is ½ to 1 in.; for mass work, from 1 to 1½ in. and for concrete to be used in structures with reinforcing bars, 2 to 2½ in. In some classes of reinforced concrete work increased plasticity or flowability may be needed. It must only be obtained by adding cement as well as water, in such quantities as to maintain the proper water-ratio, otherwise a serious loss in strength will occur.

MANIPULATION OF INGREDIENTS

In considering the final step—the manipulation of the ingredients during the making of the concrete—careful studies have been made of each operation. Included in this phase are the operations of mixing, transporting and placing, and also the curing or protecting of the concrete during the early hardening period, which is one of the most vital operations in the making of good concrete.

The time of mixing is a matter of importance in obtaining good concrete and as this factor largely controls the output of the mixer, it affects the cost of concrete. Consequently there is an unfortunate tendency to reduce the time of mixing, a practice which cannot be too severely condemned, because it results in a material loss in the strength of the concrete, and a lack of uniformity. Exhaustive tests made on concrete mixed in a batch mixer from 15 seconds to 10 minutes, show a rapid increase in strength for the first minute, and a slightly smaller increase for the second minute, after which the increase in strength is less pronounced as the time of mixing increases. This shows the necessity of mixing the concrete at least 60 seconds after all the ingredients, including the water, have been placed in the drum of the mixer, and not 20 to 40 seconds only, as is often done in road and street construction. There is no question as to the advisability of using a batch meter on the mixer, provided one can be found that cannot be tampered with, in order to avoid controversy over the time of mixing and to insure a full minute mix. When a mixer is manufactured that will not permit discharge until a certain number of revolutions have been made at a certain speed this problem will have been solved.

The revolutions per minute of the mixer within the limits of 12 to 25 R. P. M. have but little effect on the strength of the concrete, so that a sufficiently wide variation for different machines is permitted. In making tests of the effect of R. P. M. on concrete the total time was one minute in all cases, and all materials, including water, were placed in the drum before the time interval was counted.

The effect of pressure on concrete immediately after moulding is found to be due to the amount of water squeezed out, making a consequent reduction of the water-ratio. Tests were made on concrete of the same proportions, by applying pressure from zero to 500 lb. per sq. in. The water expelled was carefully collected and measured. It was found the strength increased quite materially with the higher pressures and this increased strength was almost directly proportional to the amount of water squeezed out. It is not surprising to find, then, that the duration of the pressure had no effect whatever on the strength of the concrete. Whether pressure was applied for a few minutes or for several hours the effect produced was exactly the same. It is undoubtedly the squeezing out of the water and consequent reduction of water-ratio that produces the excellent results when the roller method of finishing concrete roads is used.

The time that can be allowed between the time of mixing and the time of placing has not as yet been made the subject of extensive tests at the laboratory. This knowledge will be of value when considered in conjunction with central mixing plants, which are used with success in many places. The time which may elapse between mixing and placing without injury to the concrete is probably governed to a certain extent by the kind of cement used, by the temperature of the mixed concrete, by the nature of the vehicle and the road over which the mixture is hauled. In Illinois a limit of 40 minutes lapsed time is allowed but it is generally believed that the economical haul for the job will be the governing factor rather than the fixing of a time limit.

It is possible that some of the present ideas regarding this factor may be changed by the results of a series of laboratory tests, but until such a time it would not be advisable to allow re-tempering of concrete that has been too long in transit, as the addition of water will no doubt result in a reduction in strength.

PROTECTION

The proper protection of concrete during the early hardening period is a detail of construction that is too often overlooked and many times only indifferently carried out. The effect of proper curing conditions upon the ability of the concrete to withstand abrasion has been very strongly brought out by numerus tests in the laboratory. There is probably no factor in the handling of concrete that so affects its wearing ability, as that of providing proper protection while curing or hardening.

It is true that any and all of the factors that tend to produce strength in concrete also tend to increase its wearing qualities; nevertheless all of our tests show that other factors being the same, the concrete which is properly protected will show much more compressive strength and much less wear than that which has been allowed to dry out too quickly. As an illustration of this, at the end of four months the compressive strength of a concrete of 1.25 consistency was about 1,700 lbs. per sq. in. when it was allowed to dry out in the air unprotected, while exactly the same concrete stored in damp sand for the first 21 days gave a compressive strength of about 4,000 lbs. per sq. in., and a correspondingly less wear in the rattler test.

One of the principal causes of the poor wearing resistance that is sometimes found in concrete floors is due to the practice of allowing them to dry out without proper protection during the hardening period. Concrete floors under roof should be kept moist just as outside roads and pavements are protected. Why throw away one half of the life of concrete floors by failing to observe this rule and holding back from using them for so short a period?

The essential requirements for proper hardening are warmth and the presence of moisture, especially the latter. The tests show a nearly constant rate of increase in compressive strength and resistance to wear during the first 21 days of proper protection, after which the rate of increase gradually falls off. In deciding on the length of time that a pavement, or other structure, shall be kept covered and moist, it is simply a matter of deciding how much of the potential strength and wear resistance it is desirable to throw away, and reducing the 21 day period by that amount.

There are several methods of protecting concrete pavements and floors during the early hardening period, the most effective of which is the ponding method, and where the grades and other conditions will permit this method to be used, it will give the best results. The protection of concrete structures other than pavements is very often either neglected altogether or at best only half carried out. Many times the leaving on of the forms is considered to be sufficient protection in itself, but this is not so. The forms and all exposed surfaces should be kept thoroughly wet, or at least very moist, continuously for not less than 14 days, and whenever possible for 21 days or more.

CONCLUSION

Some of the more important developments resulting from the studies at the laboratory have been outlined herein, with two objects in view: First, to bring out the advisability of designing each concrete mixture to produce a concrete of a certain desired strength, with the particular ingredients available, and, Second, to call attention to, and emphasize the important features in the making of good cement.

In reviewing the methods to be employed in obtaining good concrete there are two points which stand out above all others, and if these are followed more good will have been done than by following all other refinements put together. The first of these, is; that the least amount of mixing water shall be used that will give a workable mix, and not one drop more. The second is, that no matter with what care the ingredients are chosen, proportioned, mixed and placed, a considerable portion of the beneficial results of this care will be nullified unless the concrete is kept moist during the early hardening period.

PRESIDENT: Gentlemen, we have listened to a most interesting and instructive address. I do not know when I have heard anything that was of more personal interest to me. In times past I have had more or less to do with concrete work and I am sorry I did not know as much then as I feel I know about it now. Many of you may be called on in later life, if not tomorrow, to either supervise or be responsible for at least the engineering work of a concrete structure. I think we all will profit by the very instructive and clear information we have obtained from Col. Boyden.

If there is no further business to come before the Club, a motion to adjourn will be entertained. Is there any further discussion or are there any questions to be answered?

MR. A. STUCKI: Before adjourning I think a vote of thanks would be in order for such an able presentation and discussion of so important a subject. I would therefore like to make such a motion.

The motion prevailed unanimously by all members rising.

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT

OF CONGRESS OF AUGUST 24, 1912,

Official Proceedings—Railways Club of Pittsburgh, published monthly (except June, July and August), at Pittsburgh, Pennsylvania, for April 1, 1923.

State of Pennsylvania }
County of Allegheny } ss:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. D. Conway, Secretary, who, having been duly sworn according to law, deposes and says that he is the Editor and Publisher of the Official Proceedings—Railway Club of Pittsburgh.

Publisher, Official Proceedings, Railway Club of Pittsburgh.

Editor, J. D. Conway, 515 Grandview Ave., 19th Ward, Pittsburgh, Pa.

Managing Editor, J. D. Conway, 515 Grandview Ave., 19th Ward, Pittsburgh, Pa.

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Sworn to and subscribed before me this 19th day of March, 1923.

SUE B. FRITZ, Notary Public.
(My Commission expires February 21, 1927.)

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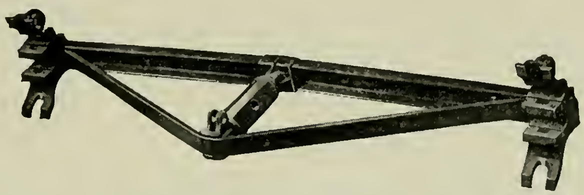

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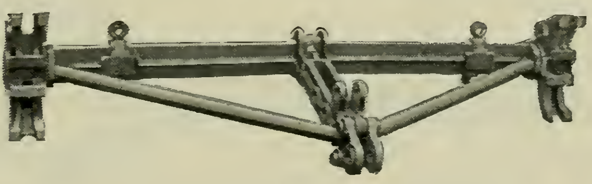

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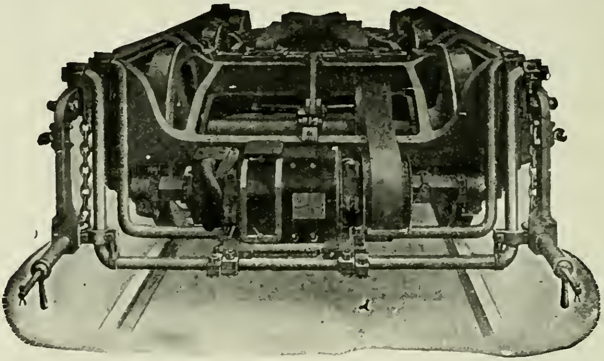

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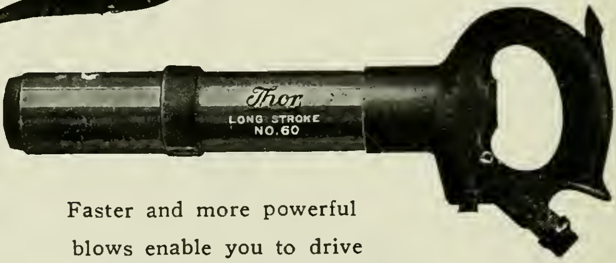

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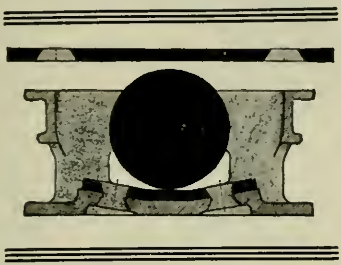

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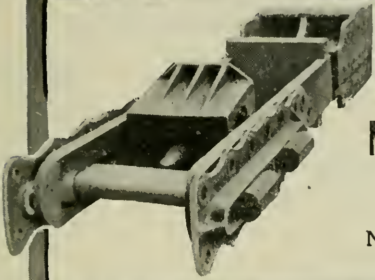

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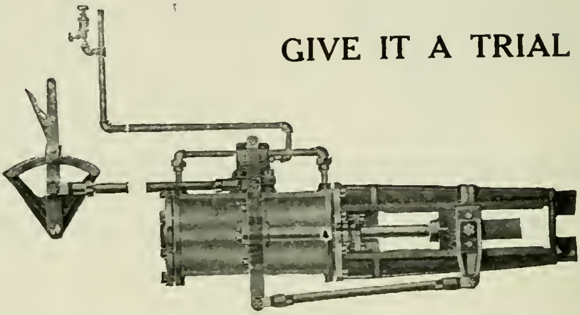

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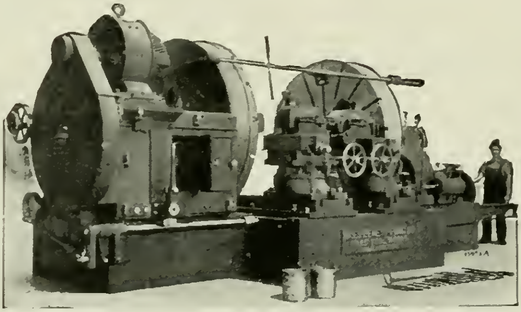

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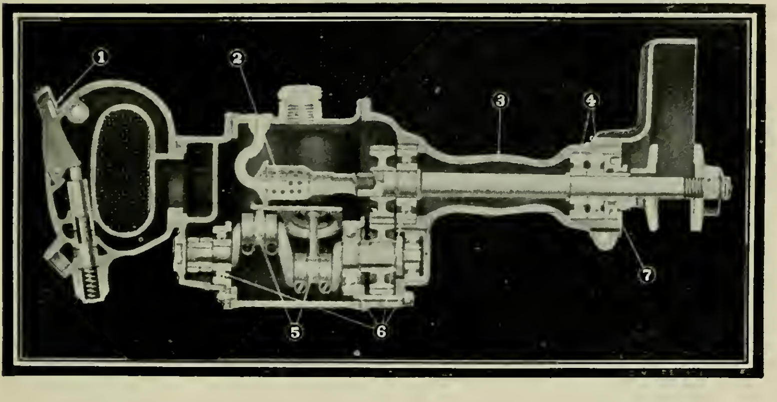

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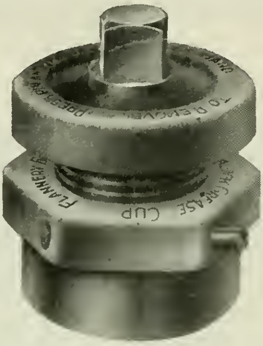

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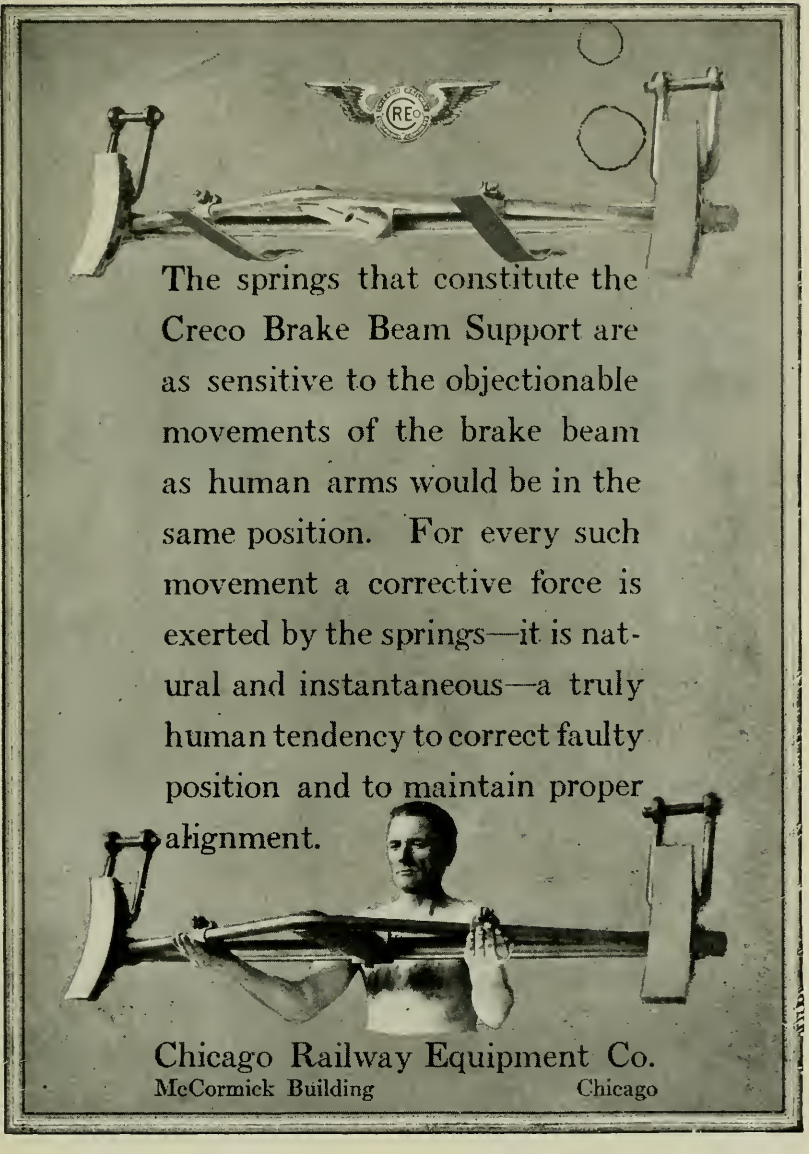

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OF
The Railway Club of Pittsburgh

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F. H. STARK	November, 1905, to October, 1907
*H. W. WATTS	November, 1907, to April, 1908
D. J. REDDING	November, 1908, to October, 1910
F. R. McFEATTERS	November, 1910, to October, 1912
A. G. MITCHELL	November, 1912, to October, 1914
F. M. McNULTY	November, 1914, to October, 1916
J. G. CODE	November, 1916, to October, 1917
D. M. HOWE	November, 1917, to October, 1918
J. A. SPIELMAN	November, 1918, to October, 1919
H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921

*—Deceased.

Meetings held fourth Thursday of each month except June, July and August

PROCEEDINGS OF MEETING
MARCH 22, 1923

The meeting was called to order in the English Room, Fort Pitt Hotel, Pittsburgh, Pa., at 8 o'clock P. M., President D. F. Crawford in the chair.

The following gentlemen registered:

MEMBERS

Adams, Lou
Adams, W. A.
Anderson, A. E.
Anderson, J. W.
Baer, Harry L.
Baldwin, S. Y.
Berg, K.
Berghane, A. L.
Bigelow, Geo. R.
Bonhoff, E. L.
Borg, J. E.
Brower, J. E.
Burtoft, Wm. E.
Caldwell, C. R.
Carbis, N. J.
Carlsson, John
Chalker, A. R.
Christy, F. X.
Conlon, John F.
Conway, J. D.
Crawford, D. F.
Cunningham, H. R.
Dambach, C. O.
Damore, Sam A.
Danforth, G. H.
Daniel, J. V.
DeVilbiss, E. B.
Donovan, J. J.
Forrest, C. H.
Geisler, Jos. J.
Goda, P. H.
Guay, John W.
Gwinn, L. J.
Hale, Chas. E.
Hansen, W. C.
Harger, M. L.
Harris, C. A.
Henry, C. L.
Hoffman, C. T.
Hood, J. M.
Howe, D. M.
Huchel, Wm. J.
Johnston, W. A.
Jungbluth, Adolph
Kelley, Henry D.
Kempf, G. P.
Kerby, Frederick
Kinch, L. E.
Kindle, W. F.
Knox, Wm. J.
Kroske, J. F.
Laylin, M. H.
Livingston, E. M.
Lobez, P. L.
Lohr, Allen W.
Long, H. P.
Long, R. M.
Lower, N. M.
Ludgate, B. A.
Maliphant, C. W.
Marshall, L. L.
Maurer, Otto J.
Meeker, H. B.
Merscher, John
Miessner, V. H.
Millar, C. W.
Moran, J. V.
McNulty, F. M.
Nelson, W. O.
Noble, Jesse A.
Orchard, Chas.
Parke, F. H.
Passino, F. J.
Patterson, J. E.

Pehrson, Alfred K.
Ralph, Wm. E.
Rauschart, E. A.
Redman, J. Thos.
Rick, R. C.
Riddile, F. C.
Ruben, J. W.
Sewell, H. B.
Simpson, Robert
Snyder, W. H.
Stilwell, K. E.
Stucki, A.
Taylor, H. G.
Ternent, H. J.
Thomas, E. K.
Trueblood, H. J.
Uhler, J. L.
VanVranken, S. E.
Walter, W. A.
Warrensford, Fred S.
Winell, K. O.
Wright, John B.

VISITORS

Biggs, Chas. H.
Blossom, H. F.
Burgess, T. B.
Buser, Fred F.
Byers, Tom
Callahan, J.
Carothers, Charles G
Carson, C. E.
Crolley, B. F.
Danforth, Ruth
Dorsey, T. F.
Echard, J. F.
Fitler, Wm.
Folk, R. E.
Garnham, L. S.
Gruber, J. W.
Gweis, Herbert
Handy, J. O.
Headington, R. V.
Hodopp, J. F.
Hogg, Francis
Hultman, Carl H.
Jex, W. F.
Jones, Earl V.
Kiefer, P. W.
Kirkwood, B. H.
Lacey, Thos. F.
Lenz, W. W.
Ludwig, C. F.
Mahan, W. C.
Mathias, D. L.
Montgomery, F. A.
Moody, E. H.
McCarthy, C. C
Robinson, W. L.
Schwab, Charles
Shriber, Wm.
Smith, M. A.
Smith, Sion B.
Van Arsdale, G. T.
Wilhelm, C. R.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Ashcraft, E. J., Asst. E. H. Fore., Penna. System, Derry, Pa. Recommended by C. Hayward.

Buser, Fred F., Mech. Engr., Pressed Steel Car Co., 6724

Thomas St., Pittsburgh, Pa. Recommended by K. O. Winell.

Carothers, Charles G., Service Engr., Franklin Railway Supply Co., Inc., 17 East 42nd St., New York City. Recommended by R. M. Long.

Dieffenbach, Harry A., Salesman, Baldwin Locomotive Works, 375 Union Arcade Bldg., Pittsburgh, Pa. Recommended by Chas. E. Hale.

Headington, R. V., Asst. M. M., Penna. System, 235 Allegheny Ave., Oakmont, Pa. Recommended by G. C. Walther.

Ludwig, C. F., Machinist, Penna. System, Box 223, Pitcairn, Pa. Recommended by W. A. Johnston.

Mead, Jess, Asst. Supervisor Air Brakes, P. & L. E. R. R.

Westerman, Albert V., Delivery Clerk, Purch. Dept., Penna. System, Moyhend St., Springdale, Pa. Recommended by G. G. Rank.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

Announcement was made of the deaths of Mr. W. Gibson Bird, Salesman, Baldwin Locomotive Works, died January 20, 1923; Mr. Edward L. Harney, Trainmaster, P. C. & Y. Railway Company, died March 17, 1923; Mr. J. F. Townsend, Traffic Manager, National Tube Company, died March 22, 1923.

PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

Is there any further business to be brought before the meeting? If not, we will proceed to the paper of the evening. It is extremely important that the materials entering into the rolling stock, locomotive equipment, also the buildings and other railway structures, be examined and tested. The developments of chemistry are becoming more and more necessary. We will therefore have the pleasure of hearing Mr. James O. Handy, Director of Chemical and Metallurgical Investigation of the Pittsburgh Testing Laboratory, who will speak to us on the subject, "Chemistry in the Service of the Railroads."

"CHEMISTRY IN THE SERVICE OF THE RAILROAD"

By James O. Handy

Last summer it was my privilege to tell the world by radio how important the services of chemists had been, and now it is my pleasure to tell you a little of what the chemist in the service of the railroad has done and is doing.

I have the assurance to attempt this latter task because the first three years of my professional work, if it may be so called, was spent in the laboratory first, of the Union Pacific Railroad, at Omaha, Neb., and second, of the Baltimore and Ohio Railroad, at Baltimore, Md.

Since that time I have been frequently thrown with railroad chemists, and have lately asked several of them to tell me what the most important recent accomplishments by chemists for railroads have been. (Acknowledgements to G. M. Davidson, M. E. McDonell, and C. P. Van Gundy.)

The first essential after getting the money to build and operate a railroad is to build it well and operate it safely and satisfactorily to the public and to the stockholders. In order to do it satisfactorily, the quality of the materials used is at once seen to be of vital importance. The chief function of the chemist is naturally the examination of the materials offered, and the suggestion of substitute materials which are good, and may possibly be had at a lower price.

From the safety standpoint the quality of the rails and of the rolling stock is of first importance. Accidents are more often caused by rail breakage than by any other one factor. The quality of rails cannot be entirely settled by chemical analysis or by physical test, but these measures of control are the best we know up to the present time. Careful studies have been made of the steel making process, so that we know the best composition for rails, and we know what part of the ingot is best and what part should be rejected. We know quite accurately how the rails should be rolled, and the allowable means of strengthening them after they are rolled. For all that, there are rail breakages occurring at frequent intervals, the cause of which is not yet clearly understood. One type of such breakage is known as the "internal transverse fissure," which apparently starts at some minute crack produced in the rail during manufacture, and then develops to such a point that the rail when subjected to service conditions breaks down. I have samples of such a break which may be seen, in test specimens at least, by those who are interested. Chemists and engineers are still working on the solution of this problem.

Next to rail breakage, the breakage of car wheels or car axles and occasionally of car couplings are the factors of most frequent occurrence.

The art of making wheels, axles and couplings is constantly improving so that the percentage of accidents from these causes is continually decreasing. The improvement has been brought about not only by the desire of the individual manufacturers to make better material, but by the co-operation of chemists and engineers through the committees of the American Society for Testing Materials, the Master Car Builders' Association, and of the American Railway Engineering Association in the preparation of specifications based on a great deal of experimental work and study.

Not all railroads have chemists, but every railroad should have, unless they can command the services of chemists in some connected organization, which is rarely possible. Dependence upon materials bearing the brand of reputable manufacturers is safe up to a certain point, but only then with certain materials. No one would think of relying on the good name of a manufacturer of metal products of varying character without himself applying the safeguard of chemical analysis and of physical test. This is especially true in railroad work, where safety depends on proper composition and proper heat treatment of metal parts of track and rolling stock.

The Pennsylvania Railroad Co. finds it pays to employ fifty chemists as well as an engineer of tests and a large corps of inspectors. They have at Altoona a large brick laboratory building devoted entirely to this work, and in the field of metal products testing, for example, they made in that laboratory 16.594 determinations of the different elements in steel during the months of January. The samples tested represented 3,511 actual shipments of steel which were to be uesd chiefly in the construction of 450 large type locomotives which are being built, partly at the Altoona and Juniata shops, and partly at the Baldwin Locomotive Works at Philadelphia. Incidentally, this work is so far advanced that they expect to have 3 or 4 new locomotives coming out every week from now on. Great numbers of steel freight cars and steel passenger coaches are being built by the railroad companies or by outside firms, and because, as Dr. Unger has told you, such cars fail by reason of corrosion more than from any other one cause, it has become the general practice to make the bodies of such cars very largely of steel containing about ¼ of one per cent copper, which resists corrosion by atmospheric exposure and by the sulphur compounds resulting from the action of the air and moisture on the coal in transit in such cars. Paint protects the outside, but the metal itself cannot be coated on the inside, and must therefore be corrosion resisting.

Bearing metals must be of the right composition if they are to have the right strength and anti-friction qualities. Formerly it was thought that the so-called "genuine Babbit" which contained nearly 90% of tin together with small amounts of copper and antimony was the only safe lining for the brasses in journal boxes in passenger coach and locomotive service. It is now known that such an expensive alloy is not necessary, but that a lining composed of approximately 87% lead and 13% antimony is perfectly satisfactory for such bearings. An alloy now used for the brass part of bearings contains 76% copper, 15% lead, and 8% tin. Some railroads add one-fourth of one per cent phosphorus, as recommended by Dr. Dudley, the great chemist of the Pennsylvania Railroad, and the man who helped to found the American Society for Testing Materials. Some railroads use from 13% to 24% of lead with corresponding variations in the other constituents. If the lead is increased, the tin must be decreased. This alloy represents an economic advance over, as well as a better product than, the old brass bearing.

Friction is an economic loss in railroad operation, because more power is required, and the bearings must be composed of suitable metallic alloys, and must also be lubricated with the right quantity and the right kind of oil or grease. Otherwise there will be hot boxes which may at best, cause delay, and at worst, accidents.

Railroad companies use great quantities of oils; for example, the Pennsylvania Railroad uses over 250 thousand (250,000) gallons of lubricants monthly. This oil must meet a variety of specifications for the varied uses to which it is to be put in the different classes of work. It is not only to serve as a lubricant for car and locomotive journal bearings, but for the steam cylinder of the locomotive, for the air compressor, and for the machinery in the construction and repair shops. Construction circular No. 148B of the Pennsylvania System gives more than 50 uses which the railroad company makes of oils and other lubricants, and states which oil is suitable for each use.

The railroad companies are probably the largest purchasers of lubricating oils, to say nothing of illuminating oils, etc. This has resulted in a great deal of work by the chemists, who have analyzed the oils, and have found out how they are made up. Finally, such knowledge, together with the knowledge of the rather generous profits exacted by the oil manufacturers, has resulted in the decision by the Pennsylvania Railroad Company to cease buying oils by brand, and to begin buying oils of the same quality in the open market, and where it was necessary, to compound these oils or greases into oils suitable for their varied requirements. The installation of such a plant meant an expenditure of approximately $200,000, but the operation of the plant has resulted in the saving of the price of the plant every year. Roughly, this means a saving of from five to ten cents a gallon on the oils used, and the result has been extremely satisfactory.

In fact, the oils made in this way have not only been as good as those which were purchased in point of service, but they have apparently in some cases given even better service; for example, the service of oils used in journal boxes is judged by the number of car miles traveled per hot box detention. The old record was three hundred thousand car miles—the best new record is four hundred thousand car miles.

From an economic standpoint, the quality of the fuel used is of the greatest importance, as coal is, next to wages, the source of the greatest expenditure; for example, the Chicago and North Western Railway Company paid out in one year, more than seven million dollars for coal, which was obtained from as widely scattered sources as West Virginia and Wyoming. Naturally it is very important for a railroad company to analyze coal shipments to see that they are getting the best coal for their money. It is true, of course, that conditions sometimes arise where any coal available must be used and quality cannot be stressed. It is also true that some of the railroads are able to use fuel oil, but the principal fuel still remains bituminous coal, which must not only be of good quality, but for the best results must be burned economically, and the invention and use of the locomotive stoker has been a very important factor in this matter.

The coal supply is important, but so also is the quality of the water supply. If steam is generated from water containing lime and magnesia compounds, scale is deposited on the heating surfaces, and very soon the quantity of fuel required increases, and the quantity of steam delivered per unit of time falls off. Further than that, there may be such overheating at points where scale adheres or lies in loose form that the tubes burn through, and accidents, or at least delay, and expensive repairs follow. As the sequence of this series of possibilities, one of the most important things which a railroad chemist does is to see to it that the composition of the available water supplies is known, and those which are naturally most pure are chosen. In nearly all cases, however, railroads are obliged to use water supplies which they know to be impure, and the chemist has to devise means of converting such supplies into purer form. It is perfectly well known that lime and magnesie compounds can be removed almost completely from water by treatment with burned lime and soda ash under the right conditions and in the right amounts. It is not best to introduce lime and soda ash or other boiler compound into the boiler directly with the water supply. The right way is to erect tanks and to treat a measured amount of water with a measured quantity of chemicals, agitate the mixture, let the sludge settle, and draw off the purified water after a few hours' time has elapsed. It is also possible to conduct the operation continuously if sufficient time is allowed for the mixed water and chemicals to react as they move along through the apparatus. Practically all railroads have water softening plants to make the operation of their locomotives and stationary boilers possible and as economical as may be. Both continuous and intermittent water softening plants may be observed in various parts of the Pittsburgh District, where they are used not only by railroads but by industrial plants. It usually costs only one or two cents per thousand gallons to soften water. The Pittsburgh and Lake Erie Railroad Company and the Union Pacific Railway use in general the continuous type of water softening plant, and the Chicago and North Western Railway and many others use the intermittent type. That used by the Chicago and North Western was devised by their chemist, who is now their Industrial Engineer, Mr. George M. Davidson.

It is a natural development of the work of the railroad chemist for him to become the right hand man and advisor of the Purchasing Agent, and if he has the necessary business and executive ability, he becomes himself the Purchasing Agent. Mr. H. B. Hodges, Purchasing Agent of the Long Island Railroad Company, was originally chemist and Engineer of Tests of the Union Pacific Railroad Company.

The railroads use so much steel in cars and bridges, etc., that they are naturally very large consumers of paint. It is necessary to protect these metal structures from corrosion from the very start; otherwise they may, under some conditions at least, weaken very rapidly by active corrosion. Chemists and engineers have made extensive investigations as to the proper quality of paint for metal structures. The work of the various committees of the A. S. T. M. has advanced our knowledge of this subject very far. The Havre-de-Grace bridge of the Pennsylvania Railroad was made an experimental station by one of these committees and some 20 or 30 different brands were applied by skilled painters to different panels of that bridge. The committee observed the condition of the paint coats at regular intervals up to 7½ years. It is interesting to know that the paint which stood up the best under these service conditions was composed of red lead of high grade, so that red lead has become the standard priming coat for steel structures, and in this case, it formed not only the priming coat, but the second and third coats also. Other pigments which have valuable properties are white lead and zinc oxide for white paints, the best results being obtained by the use of a mixture of these two white pigments. Sublimed white lead and sublimed blue lead, which are basic sulphates of lead, have been shown to have good properties for coating metallic structures. So also have certain graphite paints. The experience of the Chicago and North Western Railway Company with paint purchasing and use has led them to take up and carry on for themselves the business of making the paint which they require. The principal paint which they use is made from a deposit of iron oxide which they found along the line of their railroad and which they grind to a further degree of fineness and mix with pure linseed oil and drier; they use it for their cars and many other structures. The Chicago and North Western Railway's paint plant has grown from year to year, and they now make more than 3 million pounds of paint annually, and this comprises more than fifty different colors.

The business of manufacturing certain supplies for itself has expanded, in the case of the railroad company just mentioned, to the manufacture of boiler compounds, metal polishes, disinfectants, cleaning compounds, fire extinguishers, soldering fluids, and dyes for plush.

The chemist is at times called on by practically every department of the railroad for assistance. Not only the purchasing agent and the master mechanic call upon him for help, but the legal department in defending damage suits often put up to the chemist the question as to whether the railroad was responsible for the accident because of the quality of the metals used or whether in other cases damage to freight in transit actually did occur or whether it was damaged before being delivered to the railroad.

It was contended in one case that because a certain metal showed a crystalline fracture it was necessarily bad. The chemist and engineer of tests were able to show that even high quality metal, if broken in a certain way, shows a crystalline fracture. Damaged material which had had an ocean voyage before transportation by the railroad was shown by analysis to contain salt in abnormal amount, and therefore presumably to have been damaged by sea water.

Railroad Companies often have to consider whether they shall encourage the establishment of certain industries along their lines. The chemist can help, if the industry is a chemical or metallurgical one, by passing upon the probability of its commercial success.

Oftentimes the railroad company is offered patents or freak materials and the purchasing agent or other official hesitates to decline them for fear of offending people who perhaps use their lines for freight or otherwise, and then the chemist is called in to make a report.

Chemists outside and inside the railroad service have helped to bring about important improvements in the quality of the glass used for signal purposes in lanterns and switch lights, etc. A ruby glass has been developed which is a solid red, and it is possible to get lenses of uniform depth and color which permit the maximum of light to pass. Lantern globes made from this glass are also much superior to lead glass globes, as they will withstand shock and exposure to weather of all kinds.

In connection with water purification, not only scale forming materials give trouble, but dissolved oxygen and mineral acids cause corrosion. Dissolved oxygen may be removed by the use of a Speller Deactivator containing expanded metal or other finely divided iron or steel, or by heating the water in such a way that the oxygen escapes before it enters the boiler. Mineral acids may be neutralized by the same chemicals which are used for softening water.

Fire extinguishers are subjects for study by the railroad chemist as most of them are chemical in their nature. Less reliance is placed on carbon tetrachloride than was the case before the New York subway fire in which that chemical is said to have been applied to a fire in which there was an electric arc, with the result that poisonous gases were evolved. Used in the open, carbon tetrachloride extinguishers have a very distinct field of usefulness. Of course the type in which sulphuric acid or an acid sulphate such as alum in solution comes in contact with a solution of bicarbonate of soda and so generates the pressure and the gases favorable to extinguish fires is still extensively used.

Instances could be multiplied of the great usefulness both from the safety and the economic standpoints of the chemist to the railroad.

Before closing, I want to pay my personal tribute to the railroad chemist, and particularly to Dr. Charles B. Dudley, who was in every way a great man and a great chemist. The railroad companies and the traveling public and the profession of chemistry in general are and will always be in his debt.

PRESIDENT: We would be very glad to have you discuss Mr. Handy's paper fully. Also if you have any questions you would like to ask, I am sure he will be very glad to answer them.

MR. A. E. ANDERSON: There is a very serious omission from the speaker's paper and from his character and reputation as a chemist it is a little surprising to me, as I have known him a good many years. The great problem is to get results from the coal in the locomotives. As I understand it, the results today are not much more than 5% or 6%. In fact, you might define a locomotive to be a machine invented for the purpose of burning the coal in the fire box and shooting the heat out of the stack by the steam that is generated by the heat that escapes on the way. The proportion is so small in that line that I wondered when Mr. Handy was discussing fuel if the chemist has been able to find a way which the engineer has not found for developing more efficiency and getting the heat units out of the coal. Even the locomotive stoker does not seem to have solved the problem entirely.

MR. J. O. HANDY: This seems to be a Donegal Fair in which Mr. Crawford and I both get our heads cracked. I do not suppose chemists can be called to account for what they have done. It is a fact that in the proper burning of coal chemists have done their share, especially the chemists connected with the United States Bureau of Mines. They have made a careful study of the conditions under which coal is most efficiently burned and their results have been published and are available for Mr. Anderson and others. Of course you all know that in spite of all these investigations the burning of coal is a very crude way of getting the heat out of the coal and into the water in the boiler. Mr. Crawford, you may now defend yourself.

PRESIDENT: Gentlemen, I feel quite sure Mr. Handy will be glad to answer any questions which may occur to you.

MR. C. O .DAMBACH: I would like to ask what the loss is in coal put in stock piles.

MR. J. O. HANDY: I have no doubt there are a number in this room who can answer that question accurately. I do not know myself but I have heard on what appeared to be good authority that the loss is very small, much less than is generally supposed; that is, a loss in any way the result of storage. Storage under water and devices of that kind are more to protect from possible spontaneous combustion than from loss of heat value by oxidation. I think it would be well for anyone with information to give it.

PRESIDENT: Can any gentleman answer that question?

MR. W. L. ROBINSON: Recently I asked the Chief Mechanical Engineer of the United States Bureau of Mines the same question, receiving substantially the same answer just given by Mr. Handy. The information was requested for use by one of the sub-committees of the American Railway Association, and the Bureau of Mines representative stated that the only definite information available on the weathering of coal was that of the Illinois fields which was somewhat less than 3% loss in heat value covering a two year period of storage. The loss due to physical deterioration, account of breakage, etc., is quite a factor due to resulting slack or fineness and is probably a greater loss than that of B. T. U. value.

PRESIDENT: Mr. Van Arsdale of the B., R. & P., may we hear from you?

Mr. G. T. VanARSDALE: I do not know that I want to add anything on that subject. I have had no special experience. I might say in regard to the chemistry in railroad work, that there is practically no line of materials with which they are not in contact. In fact, I do not think there is any feature on the railroad that the chemist does not get into sooner or later.

MR. B. A. LUDGATE: I would like to ask about the bearing he referred to as being 70% lead as being in universal use; if some of them are not being used as high as 96%?

MR. J. O. HANDY: I am not quite sure that I get your question. Do you mean the lining? There have been bearing metal alloys which were made by alloying calcium and barium in very small percentages, 1% or less, with lead itself. Such compositions have been used, I do not know to what extent, as bearing metals. So there are bearing metal linings which are very much higher in lead than the ones I have mentioned.

MR. B. A. LUDGATE: I would like to ask about the causes of spontaneous combustion in coal.

MR. J. O. HANDY: I think the explanation I can give will be only a partial one. It is concerned with the oxidation of iron sulphide in the coal more than any other one thing. But there are differences in the structure of the coal, and its capability for that reason, of holding the heat which is generated by the oxidation of the iron sulphite. It is possible that oxidation of other constituents adds to the total quantity of heat which is evolved. Sulphur compounds in general have very low ignition points, relatively speaking, and just as the brimstone in the match carries the combustion forward to the wood from the phosphorus, so the sulphur in the pyrites has a similar function.

PRESIDENT: Mr. Miessner, of the Pittsburgh Malleable Iron Co., we would like to have you say a few words.

MR. V. H. MIESSNER: I had in mind one other point that I don't think Mr. Handy included in the specifications for locomotive cylinders—temperature specifications. Chemical specifications are only to guarantee the composition, also the wear. I believe there is a specification of the American Society for Testing Materials on springs, chiefly flexion, some details that cannot be determined by chemical analysis.

PRESIDENT: From the number of things on the railroad that seem to attract the attention of the chemist, there would seem to be plenty of room for discussion of the paper. Mr. VanArsdale says all features of the railroad come to the chemist.

MR. J. O. HANDY: Referring again to the subject of paints and paint pigments, I was interested in what Mr. Davidson told me about a red pigment for switch targets. First of all, for the white pigment, he said you could not use white lead there because it soon becomes colored, at least gray, and sometimes black by the sulphur fumes which it gets from the coal smoke. You must use some compound of zinc oxide which does not form a black substance but a white one with sulphur gases.

The red pigment up to a certain time was always vermilion. Vermilion is mercury sulphide and costs a lot of money, but nevertheless it was used for that red. It also had a bad habit, after about a year's service, of not holding the original color but changing to a sort of brownish red. Mr. Davidson said that while certain reds have been produced from time to time by the use of aniline dyes applied to white pigments or other base of that kind, and some of them had been failures, nevertheless his investigations carried on over a period of some length showed that certain aniline dyes were more permanent than those mercury sulphide reds which up to that time had been the best they knew, so that the C. & N. W. Railway Company use a red for switch targets which is based on aniline colors. For the sake of the reputation of the anilines, which are generally supposed to fail under such conditions, I must mention that fact.

MR. C. O. DAMBACH: I would like to ask if you can develop any other good colors besides red and green for switch lights. Yellow has not been altogether satisfactory. Have any colors been developed that can be used as satisfactorily as red and green?

MR. J. O. HANDY: The best work in special development has been done by the Corning Glass Works of Corning, N. Y. They have had scientific work going on there, both by chemists and physicists, for a long time and if anything has been developed on that point they have either done it or know about it or both. I do not personally know of any other colors.

MR. B. A. LUDGATE: The failure of metals in railroad service of various kinds, to what extent are those failures due to fatigue of the metals?

MR. J. O. HANDY: There again I cannot give you any quantitative answer. Undoubtedly there are very many cases either due or attributable to conditions partly brought about by repeated stresses. A method of testing which has become standard now is to subject a test piece to alternating stresses and determine how many reversals of stress it will stand. That is a means of getting metal quickly to the end of its life. I have no doubt that many fractures do occur from fatigue alone, but in the breakage of rails it is still a matter of dispute as to how large a factor fatigue is. Some investigators, like Mr. Howard, believe in that as the principal factor in most types of rail breakage. Others believe that other explanations come in. For instance, P. H. Dudley, of the New York Central, believes that internal transverse fissures in rails are brought about by the use of the gagging press for straightening after rails have cooled on the tables. He thinks he has seen connection between the position and character of these transverse fissures which result in breakage and the position of the gag which caused the initial crack by being applied to the head of the rail or the base. Others think he is entirely wrong about the matter.

MR. A. E. ANDERSON: What is the chemist's view point as to shock causing crystallization in steel? This metallurgist from England who gave a lecture at Carnegie Tech within the last month stated that that is now recognized to be a wrong theory of crystallization, that there isn't any real crystallization. And I asked him myself after the lecture was over to get the English viewpoint of that, as to what that meant. He said that is an exploded theory now. My notion has been that continuous shocks of the steel have caused crystallization that made the steel fiber weaker and therefore it ruptured.

MR. J. O. HANDY: It is a long story and I do not know the whole story. You are speaking of Dr. Rosenhain, of what corresponds in England to our Bureau of Standards. He has made a long study of the structure of metals. The microscope shows that metals assume a granular form and the strength of the material depends upon cohesion between these grains. Various impurities may deposit in between these grains and so limit the cohesion. When you speak of crystallization, if you have in mind that granular structure, that is not crystallization. If by crystallization you mean the formation of coarse crystals such as you see in steel castings which have not been annealed, I think the breakage of metals may be due to such formation, but it is a very unusual occurrence.

PRESIDENT: Mr. Berg of the P. & L. E., we would like to have you add a few words.

MR. KARL BERG: I am not prepared to go into the discussion. I know that engineers and chemists have done a lot for the service of railroads but yet I know we have too many breakages and too many failures and too many hot boxes.

I would like to ask what is the maximum bearing pressure on a high grade tin base bearing lining, and what should be the proper maximum bearing pressure on a lead base bearing lining. Another question, to what extent is the type of metal of a piece of casting modified by annealing?

MR. J. O. HANDY: I would like very much to have somebody else answer those questions. They are not sufficiently chemical for me.

PRESIDENT: Mr. Uhler of the Union Steel Castings Company?

MR. J. L. UHLER: I do not know that I can add very much to what Mr. Handy has already said. In the early days of my work I had the pleasure of being in railroad service and my experiences covered pretty nearly all the sub-divisions Mr. Handy has spoken of. Since that time I have been in the manufacture of steel castings. I believe a great many of the failures which have been spoken of are due partly to poor design and poor treatment in the way of annealing and some of them are due to fractures in the original casting or the piece of steel which was used.

Of course in present day service it is the duty of the manufacturer to have inspectors who are pretty thorough for the work to try to stop all defective work. Of course some defective pieces get by. That would be only human. While shop inspectors do make a few mistakes, they have been, you might say, the left arm of the railroad systems, assisting the railroads to make a more thorough inspection than they have done in the past. There is actual co-operation by the manufacturer with the railroads, and I believe today we are getting a better answer in results than we ever did before.

MEMBER: I would like to ask Mr. Handy if there is not an important chemical reaction takes place in the heating and cooling of bearing metal which is liable to destroy the alloy for the purpose for which it was designed.

MR. J. O. HANDY: I think that is perfectly true. Microscopic examination of bearing metals is very important to show whether the structure is right, even if the composition is. A person can spoil, or at least not get the best results from a very good mixture if it is not melted and poured at the right temperature.

I did not say anything in particular about cleaning compounds, soap for example. This most universal of cleaning compounds can be of such a nature that it will be very injurious to a painted or varnished surface. It must contain for such use no free alkali at all. The alkali used in making soap must be entirely used up by the fat used in making the soap or the soap will dissolve some of the oil or gum of the paint or varnish and remove the luster if it does not actually take the coating off. On the other hand, for scrubbing unpainted floors ,etc., you need free alkali in the soap compound so that you may have the scouring effect of the soda ash or other form of free alkali which the mixture should contain. It is a very important part of the chemist's work to see that the right soap and cleaning compounds are not only selected and specified but actually delivered. I did not think to ask the chemists of the Pennsylvania Railroad about soaps nor why the Pullman Company and others persist in supplying that strong liquid soap. It surely does contain free alkali and it has a very active effect on most skins. I was once rash enough to use that to help soften my beard before I applied my shaving soap one morning and I did not get over it for several days.

MR. A. E. ANDERSON: Mr. President, if there is no further discussion or question, I take pleasure in moving a vote of thanks to the speaker for his instructive paper. It proves what I have said on more than one occasion, that it is another illustration of the work that is going on by which we can see that the silent service of the laboratory produces safety in operation. This work is something the public does not know anything about and they should be informed so as to appreciate what is being done by the various agencies to produce safety in public travel and operations of that kind. The unfortunate part of this is that it reaches people who know something about it but it does not usually reach those who do not know and those who are prejudiced against railroads because they think they are agencies of profiteering in freight rates, instead of using every effort to produce and protect freight and passenger travel at its highest efficiency.

The motion prevailed unanimously by all members rising.

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

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W. GIBSON BIRD
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EDWARD L. HARNEY
Died March 17th, 1923.

J. F. TOWNSEND
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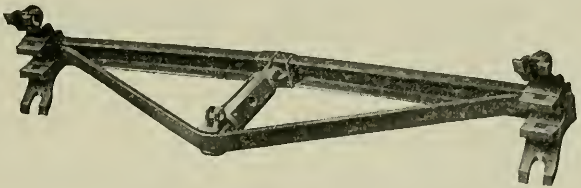

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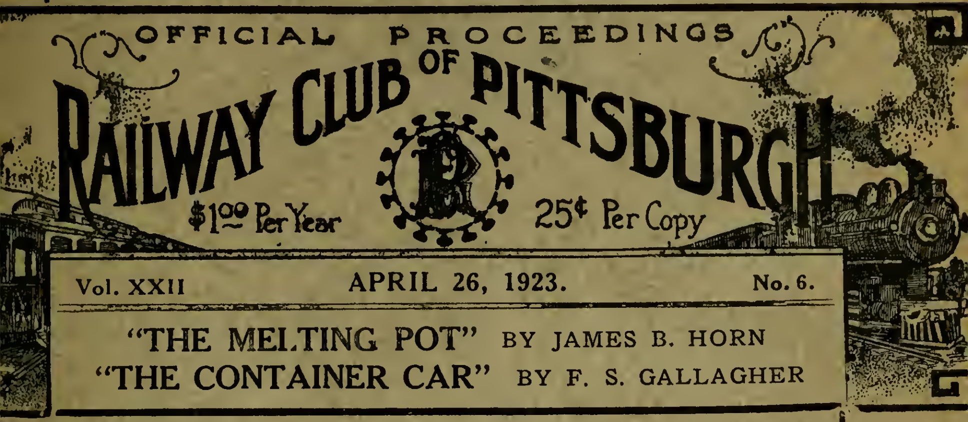

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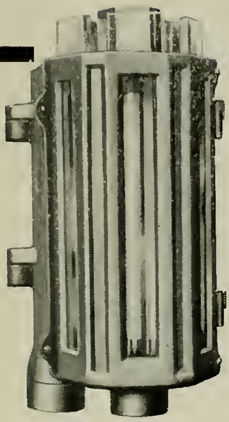

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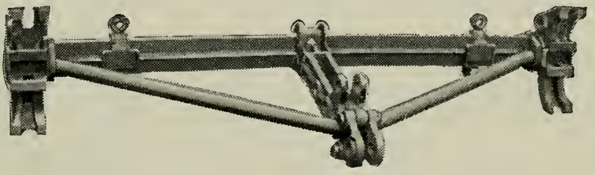

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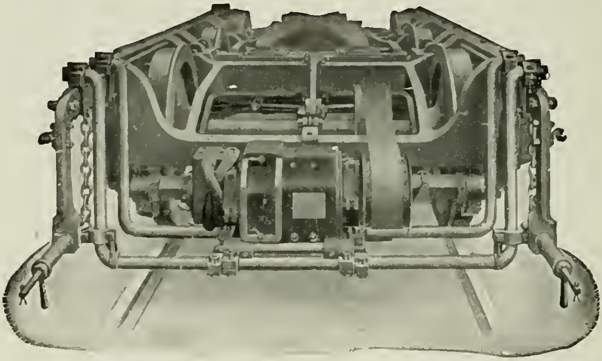

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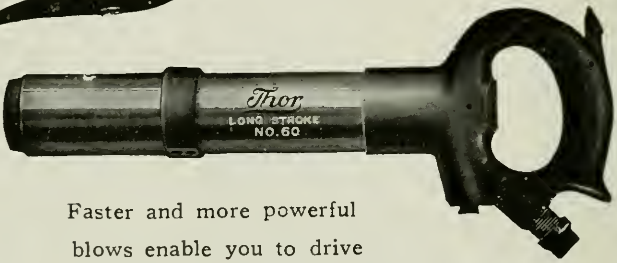

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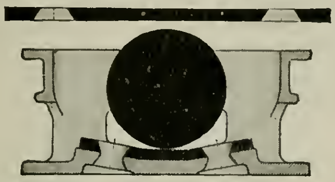

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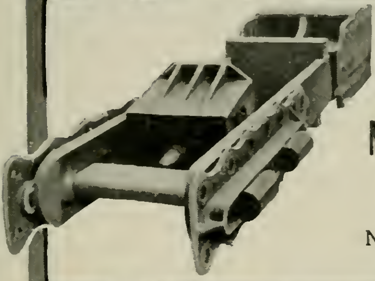

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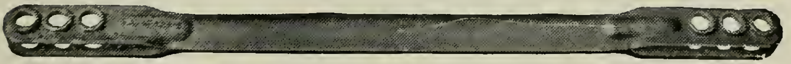

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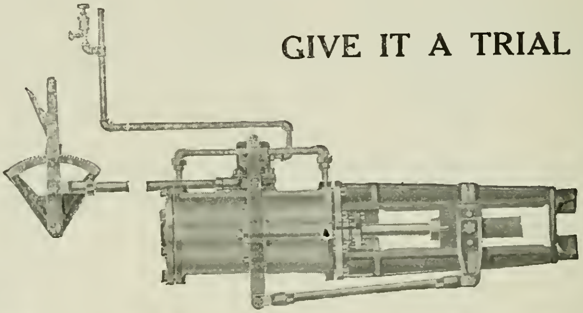

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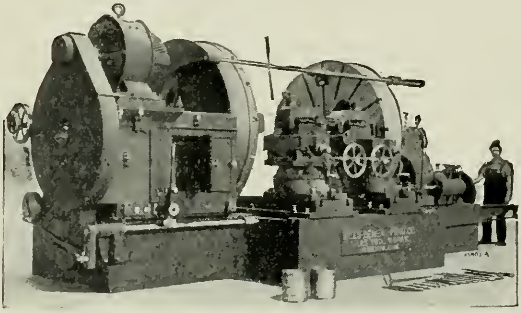

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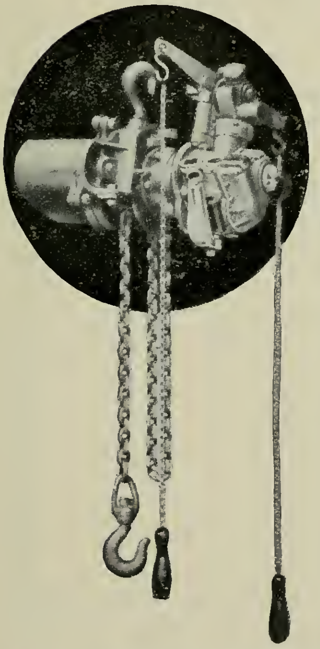

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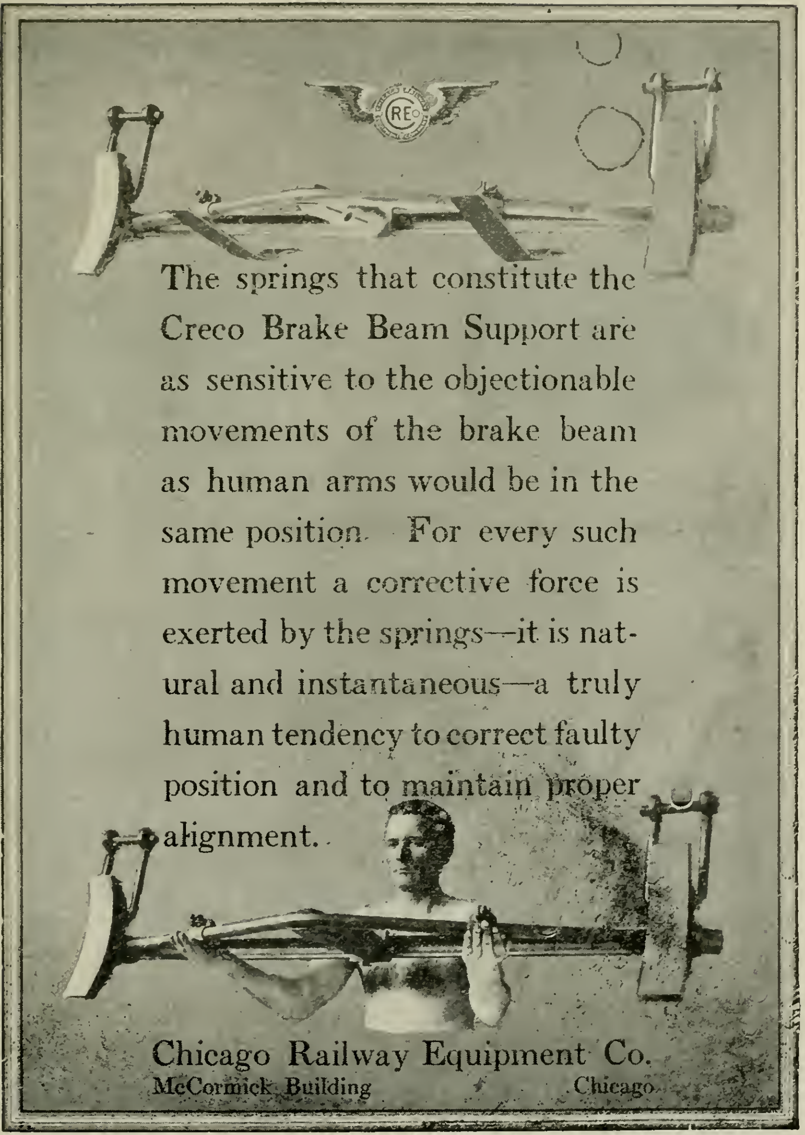

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Pittsburgh, Pa., Apr. 26, 1923
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*J. H. McCONNELL	October, 1901, to October, 1903
L. H. TURNER	November, 1903, to October, 1905
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*H. W. WATTS	November, 1907, to April, 1908
D. J. REDDING	November, 1908, to October, 1910
F. R. McFEATTERS	November, 1910, to October, 1912
A. G. MITCHELL	November, 1912, to October, 1914
F. M. McNULTY	November, 1914, to October, 1916
J. G. CODE	November, 1916, to October, 1917
D. M. HOWE	November, 1917, to October, 1918
J. A. SPIELMAN	November, 1918, to October, 1919
H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921

*—Deceased.

Meetings held fourth Thursday of each month except June, July and August

PROCEEDINGS OF MEETING

APRIL 26, 1923

The meeting was called to order in the English Room, Fort Pitt Hotel, Pittsburgh, Pa., at 8 o'clock P. M., President D. F. Crawford in the chair.

The following gentlemen regitsered:

MEMBERS.

Abel, A. W.
Adams, L.
Adams, W. A.
Ainsworth, J. H.
Anderson, A. E.
Anderson, J. W.
Berg, K.
Berghane, A. L.
Bernoulli, W. H.
Bigelow, Geo. R.
Bonhoff, E. L.
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Bowery, Frank J.
Brewer, G. D.
Brower, J. E.
Burnside, C. J.
Buser, Fred F.
Cady, P. C.
Caldwell, Chas. R.
Campbell, J. T.
Carlsson, John
Carr, T. W.
Chalker, A. R.
Christy, F. X.
Clark, Chas. H.
Conway, J. D.
Coumis, Gust
Courtney, H.
Crawford, D. F.
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Croke, Thomas F.
Cunningham, H. R.
Cunningham, J. L.
Cunningham, R. I.
Daley, John
Dambach, C. O.
Davis, Chas. H.
Davison, C. R.
Dellmin, T. D.
Devans, E. J.
Donovan, J. J.
Durkin, Jas. E.
Durkin, Wm. L.
Ellis, A. R.
Emery, E.
Fitzgerald, T.
Fowler, W. E., Jr.
Frey, A. R.
Geisler, Jos. J.
Gibson, G. A.
Goda, P. H.
Gowland, S. I.
Harger, M. L.
Harsh, H. H.
Haynes, J. E.
Hazlett, H. H.
Headington, R. V.
Hoffstot, Henry P.
Holmes, E. H.
Hood, D. G.
Hood, J. M.
Howe, D. M.
Huber, H. G.
Hughes, Wm.
Jenkins, R. H.
Johnston, W. A.
Jungbluth, Adolph
Kasnitz, J. J.
Kasnitz, Jesse
Kelly, L. J.
Kempf, G. P.
Knapp, A. D.
Knox, Wm. J.
Kroske, J. F.

Laird, Geo. R.
Lake, Albert H.
Lanahan, Frank J.
Lanahan, J. S.
Lang, W. C.
Langbein, Paul
Laurent, G. F.
Lehr, Harry W.
Livingston, E. M.
Lohn, Allen W.
Long, R. M.
Ludgate, B. A.
Ludwig, C. F.
Lynn, Samuel
Lynn, Wm.
Maliphant, C. W.
Matchett, H. K.
Maurer, O. J.
Meschter, E. F.
Miessner, V. H.
Millar, C. W.
Milliken, J.
Mitchell, J. Wallace
Mitchell, T. J.
Moore, D. O.
Moran, J. V.
McKee, S. Frank
McNulty, F. M.
Nicodemus, Earle H.
Noble, Jesse A.
North, D. P.
Orchard, Chas
O'Brien, Martin J.
Parke, F. H.
Passino, F. J.
Patmor, H. F.
Pehrson, Alf. K.
Phillips, W. H.
Profit, J. W.
Quinn, J. M.
Rabold, W. E.
Rauschart, E. A.
Redding, D. J.
Redding, R. D.
Reeve, Geo.
Renshaw, W. B.
Richardson, H. R.
Rick, R. C.
Ryan, D. W.
St. Clair, Chas. B.
Salisbury, Wm.
Sattley, E. C.
Seiss, Wm. C.
Severn, A. B.
Shannon, David E.
Shultz, Geo. J.
Simpson, Robert
Smith, John L.
Snyder, W. H.
Speir, Wm. S.
Spielmann, J. A.
Stevens, L. V.
Stilwell, K. E.
Stoller, Karl M.
Stucki, A.
Suckfield, G. A.
Tucker, J. L.
Walter, W. A.
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White, A. B.
Winell, K. O.
Wolf, H. M.

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Androc, Fred
Baker, Joseph
Balzer, C. E.
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Benjamin, R. M.
Bergman, O.
Bodenham, A. J.
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Cunningham, W. P.
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Peiffer, Chas. E.
Perkins, H. E.
Pitcher, Wm.
Rhodes, W. H.
Robinson, G. P.
Schramm, R. L.
Schreiber, C. R.
Schwab, Charles
Spurr, A. C.
Stokes, Nathan
Streib, J. F.
Sundholm, F. J.
Terheyden, R. J.
Treschow, K. F.
Twitchell, D. L.
Zinsmeister, R. J.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Adams, Frank T., Railway Salesman, The Patterson-Sargent Co., 201 Fitzsimmons Bldg., Pittsburgh, Pa. Recommended by R. L. Robinson.

Ainsworth, J. H., Railroad Sales Dept., A. M. Byers Co., 410 Union Bank Bldg., Pittsburgh, Pa. Recommended by F. H. Freshwater.

Akins, A. P., Gang Foreman, Pennsylvania System, Derry, Pa. Recommended by E. J. Ashcraft.

Burke, George C., Gang Foreman, Pennsylvania System, First Street, Derry, Pa. Recommended by E. J. Ashcraft.

Hagerty, J. W., Accountant, Purchasing Department, Pennsylvania System, Dravosburg, Pa. Recommended by Chas. R. Caldwell.

Hultman, C. H., Draftsman, Pressed Steel Car Co., 99 Grant Ave., Bellevue, Pa. Recommended by Alfred K. Pehrson.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

Announcement was made of the deaths of Mr. Wm. E. Brumble, Representative of the Nathan Manufacturing Company, died March 2, 1923; Mr. J. B. Yohe, Jr., Superintendent, P. & L. E. Railroad Co., died March 25, 1923.

PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

Is there any further business? If not, we will proceed to the subject of the evening. It is not often that we are privileged to hear two sides of a story at one time. Usually the speaker presents but one point of view. We are to have the pleasure this evening of hearing a man who has seen both sides of a very serious problem and who will give you the view from both sides, Mr. James B. Horn, B. S., of the University of Moscow, who will speak to us on the subject of "The Melting Pot." Allow me to present Mr. Horn.

"THE MELTING POT"

By James B. Horn.

MR. JAMES B. HORN: Mr. President and Members of the Railway Club of Pittsburgh. You see in front of you a man who began life with a big ideal. It was in a school in Russia where we formed a secret Society that these ideals took root. Now what was that ideal? To overcome that which we recognized as false in the only organized society which we knew anything about. As Russians we saw nearly 200,000,000 human beings being practically enslaved, not the owners of their own soul. Denied liberty to read, write, speak or walk without a censure. And the centuring, gentlemen, was strictly observed by the ruling class in Russia. Any citizen who was found guilty of violating knowingly or unknowingly, any part of the rules laid down by the censor was liable to be punished by not less than 20 years of hard labor in the Siberian Mines.

Now I was nearly a victim of that crime, by just reading a book which you all know and love, the history of Abraham Lincoln. It may sound funny that by reading a history of Abraham Lincoln a man should be punished for it. But to my great sorrow and regret the authorities in Russia were bitterly opposed to Lincoln. He was too liberal. I remember it was on a cold December night that I was sitting absorbed in the story of the life of that great Emancipator when suddenly my attention was attracted by the sound of footsteps, of some one pacing up and down in front of my window. I arose immediately and instinctively felt that a blood hound of the Czar was on my track. I swiftly threw that book into the fire and watched the flames devour it. I replaced my book by the Holy Bible and before I had time to open it a tremendous crashing fell upon the door. I immediately responded to that gentle call and admitted half a dozen gendarmes. After a search was made in the name of the Almighty Czar and every scrap of written or printed matter was carefully collected and taken for investigation, I was thrust into a cage on wheels, used for the transportation of political prisoners, and taken to the Colonel of Gendarmes. After 30 days of appearing, 30 days of torture, daily examinations—and when I say torture may I illustrate it by the way it was inflicted upon me. I was led into a room where the judges were all sitting, all with black masks. I was stripped half naked and let down into a trap door. Down below they had two Cossacks whipping me while on top they were asking me questions, and if my answers did not correspond with the wishes of the authorities they had to carry me out because they whipped me so long until I fainted. Finally, not finding any evidence to convict me of that horrible crime of reading, I was released.

Now, gentlemen, I am going to ask you a fair question.

Do you blame us for organizing into secret societies to overturn a tyrant who made it impossible for me to read? Now this secret society to which I belonged was simply one of many in Russia. The members of it dedicated themselves to their ideals and hazarded their lives for their belief. In front of a firing squad many of my young associates went to the great beyond. Others went to Siberia. Five years later I was found guilty of Marxonian principles and I found myself amongst a detachment sent to the Siberian mines. Some men of our secret societies came along with us and we again dedicated ourselves to the destruction of all government that we knew anything about.

Gentlemen, to describe to you the horrors that existed in the Siberian mines is beyond human imagination. To men of the twentieth century it would sound unbelievable. Every political prisoner, as soon as he reached his destination, for the least offense, was taken to a blacksmith and was presented with an iron bracelet fastened by a chain to a wheelbarrow. Here, gentlemen, I still carry the mark of the bond that held me chained to a wheelbarrow for a period of eight months. We were chained in pairs to each wheelbarrow. My mate, who was weak and could not bear the tortures inflicted upon him, after three months of suffering, died. The guards being unable to secure a blacksmith immediately on account of the heavy storms, I was compelled to take my dead comrade's body into the wheelbarrow, and carry it around for three long days, until a blacksmith was secured, the corpse removed and replaced by a living convict. More of the horrors of the Siberian mines I shall not inflict upon you, but you, gentlemen, can know its influence. With the help of some comrades I escaped from the Siberian mines. Embittered, but hopeful, I was placed in an empty sauerkraut barrel. And here I shall mention the fact that every political prisoner known to have escaped from the Siberian mines made his exit in the same romantic way. I assure you, gentlemen, it was not pleasant in that barrel. The fact is, I have never liked sauerkraut since. Some of the comrades placed the barrel on a wagon driven by a man who was also a member of our secret organization. and off we started for the frontier.

Forty-eight hours later we arrived at Harbin, China. Here some coolies rolled the barrel away. And they did not handle it very gently. When the barrel hit the ground I thought the end of the world had come. Late that night, however, some other comrades came to the rescue and helped me to escape, and 48 hours later we arrived in Harbin.

To describe to you the trip from Harbin to London would be impossible. It would take too much time. But I want to tell you that I became a stowaway on a vessel bound for England and finally arrived in the British Isles. I was apparently a good speaker and I want to emphasize the fact that my Marxonian theories were in much demand. I preached the doctrine of Socialism and Communism from the slums of White Chapel to the grassy fields of Hyde Park in London. But hearing much of America, after being three months on British soil, I embarked for the great land of liberty.

Gentlemen, words are weak to portray my feelings at the sight of that great Statue of Liberty as we came up the bay, with that arm outstretched and that torch of liberty in its grip, there was an awed silence among all my fellow passengers in the steerage. Here was my big ideal towering over a hemisphere. Here, as I landed, I would be taken into the arms of a great people and receive the patrimony of mankind. Overcome with emotion, I dropped on my knees with my arms outstretched and head bowed. Now, why kneeling, why with arms outstretched? I don't know. My comrades and I had renounced the theory of a God in the Universe. Any way I was impressed to the highest degree as we entered the Promisary Land. I believed that we were entering a land of equity and brotherhood. But at the wharf in New York other International Comrades met me and I was taken to the office of a leading Socialist paper, and after being introduced around, I began to express my great joy at being in a land of liberty. But, lo, and behold, it was proved to me that liberty was a word without meaning, here as in the rest of the world, and that instead of one Czar we have thousands to overcome. And whom do you think were those thousands of Czars here in America?

They were you and you and you, every engineer, every supervisor, every foreman was described as a Czar controlling the government and keeping their workers in slavery. I was told how through intrigue and manipulation the liberty of this country might be scoffed at. Some of the leaders asked me a question, "Why are there so many strikes occurring all over the country, if the workers are not kept in slavery?" I was taken down to the slums of New York and I was shown the abject poverty of it, and it was pointed out to me, "Look, you see." That is what the employing class does. I looked, I listened and I was absolutely convinced. I was told of a strike that was on in Philadelphia, and knowing my fluency as a speaker on Socialism and Communism, I was sent there. On every opportunity in Philadelphia, at the corner of Fifth and Pine, I mounted my first soap box and the fight began. I have preached this theory from the shores of the Atlantic to the shores of the Pacific. I have seen the inside of many jails from Maine to California.

Now why those experiences? Why did I submit to be tarred and feathered in San Jose, California? To me, gentlemen, it was a big ideal, the ideal of writing wrong, a principle, an aim which started away back in Moscow at the University. And I am by no means the only human being who has sacrificed and suffered for a light that he has seen, for an ideal that has come to him. Equality of rights, equality of opportunity, is an ideal, not only of acknowledged Socialists, but undoubtedly of each and every one in this audience. The only problem that lays before you and me as heirs of other generations is what direction to take in order to provide and maintain those opportunities and rights. I know that every one of you gentlemen will agree with me that every one of us is the product of circumstances and environment. The reflex of our contact with things and thought makes us what we are. An eminent economist in Philadelphia said of me one day, he is a perfectly natural product, meaning the reasoning process which I had, made of me the radical that I became. Do you get that point? We would all create Utopian Brotherhood and service is an ideal hidden in the archives of every human breast, whether it is voiced or not. How to obtain that ideal has brought about many proposals.

Starting in life with a prejudice against all existing order, it was not difficult to work myself up to the fervor and fury of the reformer. Becoming a reformer, I, just as any one else in that position, gave much thought as to what could be my strongest appeal. I recognized, the same as any other successful radical, that my challenge would be most powerful if built upon that which is within the breast of every human being, and that is dissatisfaction with himself and conditions. Some people develop contentment, but it is an axiom that no one is satisfied. Have you thought of this? Don't you see the great power of using this forceful appeal? Certainly you see the appeal. Every one is looking to get more out of life and to overcome that which appears to stand in his way. The power that is over the mass is quite generally recognized, and properly so, as government and leading men. America's government, as you all know, is a republic, and it is the employer who gives work to those living under a government, who are naturally its foremost men. You know, and every one who has studied comparative government knows, that the more liberty there is provided for initiative and maximum freedom, the more possible it is for weak spots to appear in the administration thereof. Is it not simple that a republican form of government, designed to give the greatest liberty of action to individual effort, naturally allows unusual opportunity for political chicanery? It is the natural and unavoidable flaws that gives to the critic his weapons. He points to weaker details in existing order and says, equality and fraternity do not exist. He declares all men to be equal, and may be his wish is father to the thought. Is it not natural and human that he should wish and hope that he might be equal to the greatest of men. Isn't it a wonderful slogan, equality, to the common man who realizes his humble station, that he is not any more than a nondescript cog. You take socialism, communism, syndicalism, anarchism or any other ism we know about, you all know their theories are based upon dividing up the world's goods. Why, of course, it appeals. They interpret all men as being equal. Wouldn't that inspire the man who lives in mediocrity? It visualizes all men as being brothers and unselfish. Now isn't that ideal? Just imagine a world where none shall want. Doesn't that appeal?

Now I want to tell you that those who are advancing these theories of government and human relationship are not all ignoramuses or hypocrites. Whether you believe it or not, their theories they honestly think would improve society. We have seen an illustration in Russia, where a few zealous reformers can stage their reformation, that a mere handful can hold power and dictate the destiny of nearly 200,000,000 fellow men. These men at the head of Russia are an illustration of the adage that a little knowledge is a dangerous thing, when psychologically administered.

You gentlemen who are representing a big idea, the railroads of America, you who are in reality the railroads of America, you have a great responsibility in this twentieth century, and probably greater than you know of. You see before you a man who was a victim of acquiring what? **A one-sided knowledge.** With integrity of purpose I became a foe to civilization in this twentieth century that represents the total progress of humanity. And now I am to the point of my story.

A lack of knowledge in the history of human progress and human nature in its relation to government is the germ from which all isms spring.

I have preached the theories of the isms for many years simply because I failed to receive the practical education of man himself. It was early in the Great War that I began to receive strange and to me confusing impressions. I became conscious that I was faceto face with some strange realizations. As an advocate of higher, higher and higher wages I saw my dreams realized, but shattered to the ground by the counter realization that higher wages did not mean any more, that prices followed wages right along and no one was any better off. This was my first jolt, and a pretty stiff one. But I passed it over. And when that great farce which you all remember, government ownership of railroads, became an accomplished fact, I said to myself, "Now we are coming into our own." But later, when I saw what government ownership did to the railroads, I could not help but see decreased efficiency, increased cost, and the worst of it, the man who works paying the bill. These illustrations, although they disturbed me, yet did not disqualify me in my work.

Then along came Russia, throwing off the shackles of the Czar and starting a Simon pure democracy. And when I saw that attempt crumble and out of it come an absolute dictatorship and autocracy as complete as the world has ever known, I received another shock even greater than the first.

Now what was wrong? It could not be my theories. Yet something was wrong. Things did not work out right. And it took me quite a while until I was brought to see that all men are not born equal, that ancestry and the formattion of head and body can not be denied, and that equity can only pertain when greater service by the individual brings greater reward, that the lazy must be recognized only in conformity with his service. That the so-called capitalism is merely another name to an industrial system and is a reward for accomplishment in conformity with effort and service, that maximum production by each and every individual is the only way of bringing about a greater distribution of clothing, more food and better housing and the material comforts of life, that it is only through the encouragement of maximum initiative that the greatest service can follow.

Now these, you may say, gentlemen, are simple truths. But are they common in the way they are given to all men? If they were you would not see before you a man who would importune you to establish in your schools a comparative study of social system, who would importune those in authority to give the truth upon human tendencies and human relationship, upon government, society to those who are in your charge. The only redemption I can see is to tell to those whom you can reach, the truth about our industrial system and our industrial economics. The proselyting of the workers in and out of the plants and the number of paid speakers, booklets, pamphlets that are daily in this country arguing for the destruction of the American government and its industrial system, would make you Americans gasp and say, "It cannot be." That to which

I will point, however, is a simple remedy, not difficult, but it takes diligence and patience, and that is education. Don't misconstrue me. I do not mean education in the school terms, I mean a practical education, conveying the truth about our American government and our institutions, whereby one who has received the other side of the story may compare and get the truth. But the proselyting of the workers today is simply beyond the practical possibility of any one to imagine. Did you ever stop to think that each and every one of you was born into and grew up in an industrial system and accepted it just as a matter of course with little or no thought about it? You know there is now being propagated throughout the United States another industrial system which is just the antithesis of the existing one, something similar to Russia. You all know that the system we have today is the development of the centuries, and as you look at it, as you study it in all its ramifications, you see two major fundamentals. One is that the system has brought about a workable plan which is designed to encourage maximum initiative by each and every individual. Now turn to the other fundamental base and you will see that it rests upon maximum production by each and every individual. Now let us take for comparison Socialism, Communism or any other ism that the whole world is leaning toward. In order to grasp their fundamentals it will be necessary to boil them down, to squeeze them into a mass and look at them simply and clearly. And what do we see? A leveling process, all men to be treated equal, regardless of their willingness or capacity for service, no one to receive more than his fellow working next to him, regardless of his efforts or ambitions. And what results do you expect? The stifling of all initiative. I am speaking from practical experience. Russia has leveled 150,000,000 human beings and what is the result? Two million children died two years ago on the plains of the Volga, they starved to death in a land of plenty, in the granary of Europe. That is the result of the leveling process.

Now let us squeeze them together again and take a look, and you will see that its second major fundamental is that of curtailing production, on the theory that it gives more jobs to more men. I shall not tire you by going into any analysis of these two diametrically opposed systems. You have listened to the condensed truth. This truth happened to reach me—and I say happened, because it has reached but a limited number of those who are in the dark. Now stop and think a moment; isnt' it a fact that education, I mean the conveyance of information, the truth to others has made this country the most advanced nation in the world thus far. Isn't it a fact that after you have searched the history of all governments, that each one represented the development of its mass of individuals. And after you have looked upon the slow process of civilization throughout the centuries, you see represented in the republican form of government in the United States a plan of human association that is far greater and much better and gives more human happiness than any heretofore devised or practiced by man. Now what has caused this nation to become the greatest in the world? Isn't it because of its workable plan which was designed to encourage maximum initiative and maximum output by each and every individual? Any destructive thought that has a cause to combat these two fundamentals is not only striking a blow at government, but at each and every one individually. There are twenty million workers throughout the United States that are kept in the dark the same as I was. Some of them are your workers, who are getting a constant stream of different destructive thoughts. Why not use your influence by giving them the right kind of reading? What is the right kind of reading? What is the necessary education? Isn't it that of the simple fundamentals of the Constitution of the United States, where it gives them an opportunity to work where and for whom they will? Isn't it that of giving to them the simple funadmentals of capitalism, showing where it is designed to reward the industrious in conformity with his skill and application? Isn't it that of giving to them in plain and simple words the economics of industry so that he can understand whereby he clearly sees that unit production governs everything and the less there is produced the less there is to go around, and that there is no vest pocket panacea that will help the simple works of natural law? Isn't it that of giving to them the simple fundamental of getting ahead that you have worked on that has placed you in the position that you occupy today? Recognizing those great opportunities that you know exist for all those who recognize these fundamentals, are you not inspired to carry the truth to each and every one within your sphere of influence? And in the range of your own workers to overcome that false and blinding plea of destructive thoughts that are reaching them today? Gentlemen, give them a copy of that document that was penned by your forefathers, give them a copy of the manuscript that stands as the emblem and pride of your nation and my nation and of all the nations, a manuscript which was won through noble heroism, sacrifice and suffering, and was written with blood-stained mutilation and martyrdom of your forefathers, the most sublime paper ever penned by man, the Constitution of the United States.

Now gentlemen ,these fundamental laws, if read and explained to those who need an explanation, is the greatest and most powerful antidote for those destructive thoughts that are reaching the workers today. Give them the truth about production, instead of the falsehood they are getting from the other side. Give them in plain and simple words and for the first time the truth about capital and labor and show them where their best interests lies. You can show them that we are all consumers and as consumers we must pay the bill whenever and for whatever cause industry slows down. The spirit of brotherhood, as I take it, can only be a true spirit through understanding. And let me tell you, gentlemen, that understanding, I prophesy, will increasingly take the place of misunderstanding throughout all industry. The most eminent economists, and in whom I have the most faith, are practically in one mind, that the wage earners desire increasingly voiced for a better life is not an unworthy aim and purpose. Were this not so civilization would have failed in advance. Unfortunately the misunderstanding which exists is simply by voicing their aims and purposes without taking into consideration the economics involved.

So much for the employee. The employer on the other hand, most of them, are thinking how to avoid, how to preclude these higher wages. But we see the dawn of a better understanding whereby employers everywhere are beginning to understand and realize that the objective, that the panacea is not to balk those aspirations, but to see that these aspirations are fulfilled. And it is simply, as you all know, through increased unit production, taking the latent, unused talents and capacity, and utilizing them to the fullest extent. Is it not such the spirit of brotherhood, service. Gentlemen, there is only one way to overcome all destructive thoughts and that is simply by using your constitutional privileges of your forefathers and teaching truth and justice to all mankind.

I thank you.

PRESIDENT: Mr. Horn's most interesting talk was so complete that I doubt if we can ask for a discussion of this wonderful presentation. Some of you, however, may have a question you would like to ask Mr. Horn and if so, opportunity is now given.

MR. A. E. ANDERSON: Mr. Horn has covered a wonderful subject and I believe he can answer a question I have raised time and time again, in a way that I believe no one else could answer it. I have advocated for a number of years that men like Mr. Horn, when they land in New York, should in addition to being passed by the customs authorities, be met by some educational representative of the government, instead of being allowed to run wild and fall into evil hands. He should be given to understand that within a certain time, say six months, he should declare his intention to become a citizen of this country and there should be provided a course of instruction, such as Mr. Horn is pleading for, whereby he could be corrected of these misguided thoughts and aspirations that he acquired in the darkness of Russia and that are being taught throughout the industrial section as he describes it today. I think he is entirely correct that there is an undercurrent among the working men and paid emissaries are carrying out these false doctrines, doing their utmost to upset our constitutional methods.

What I want to ask Mr. Horn is, had he been met by such a procedure as that when he landed in New York, would that have resulted in guiding him in a different direction, which he has reached now after a circumlocution of many years and much suffering in constancy to what he now admits to be entirely wrong in principles?

MR. JAMES B. HORN: I absolutely agree; if a society or any other organization would exist to receive the entrants when they come over to this country, many of the evils we have today coming with the foreigner would be eliminated. There is no question about that. But to my very great regret, I do not know of any such organization in existence.

MR. A. STUCKI: Instead of asking Mr. Horn a question, I would like to ask the President if this address will be published.

PRESIDENT: It will.

We have another paper which I think will be of great interest to the Club this evening. Mr. F. S. Gallagher, Engineer of Rolling Stock of the New York Central Railroad Company, will describe to us the "Container Car," of which perhaps some of you have heard. He will illustrate his paper with lantern slides. It affords me pleasure to present to you Mr. Gallagher.

CONTAINER METHOD OF HANDLING LESS-THAN-CARLOAD FREIGHT, MAIL, EXPRESS AND MILK, AS HANDLED BY THE CONTAINER SYSTEM.

By. Mr. F. S. Gallagher,
Engineer of Rolling Stock, New York Central Railroad, New York.

Mr. President, Members and Guests of the Railway Club of Pittsburgh:

It gives me a great deal of pleasure to have this opportunity to address you on the subject of shipping containers and I hope this talk will be as interesting to you as it is to me. I appreciate this honor very much and trust that we will all learn something from this discussion.

In order that you may know what I am talking about before I am half way through, I will ask the operator to show a picture of the container cars.

The subject of shipping containers is very large when viewed from various angles and if we had one commodity only to deal with, a container for this commodity would be a very simple thing to devise, but a container must be suitable for the handling of all classes of freight.

The shipping container under discussion is not a packing box, but a section of a car to be used by the shippers of less-than-carload freight, giving the shipper all the advantages of the carload movement.

We talk standardization and standard practices and in regular equipment have accomplished a great deal, and this work of standardization will progress until we have reached perfection in railroad equipment.

We have a box car of standard dimensions and a shipper using that car knows that it is not possible to put anything in the car which is larger than the dimensions. This may be a little far in the subject but I wanted to answer the question that has been put to me a good many times and that is that the container will carry packages of only a certain maximum dimension. This is the truth and the user of the container would not undertake to use a container for commodities which are too big to be handled that way, therefore, a container of standard dimensions to give the shippers of less-than-carload freight all the advantages of a carload shipment may be devised and should be in its use, as successful as the box car is today.

There are a number of advantages which I claim for the container system of handling less-than-carload freight which I believe will overcome a good many times any disadvantages.

First: By the container method, expensive boxes or crates can, to a great extent, be eliminated and the goods packed into the container in their original packing with just enough support to prevent their damaging themselves.

Second: The protection afforded by the container from the elements because it is possible to build economically, a weather-proof container.

Third: The assurance it gives shipper and consignee, that the goods placed in the container will be delivered to the consignee, as they are shipped, saving the consignee and the carrier the annoyance of having packages lost or damaged enroute.

We all know what it means to have a consignment of goods delivered, for which the consumer is waiting, and find one package has gone astray, rendering the whole shipment useless until this one package is found or replaced.

This is not a fault of either the shipper or the carrier and is a condition over which neither have positive control because it is very easy for a trucker, in the shipper's warehouse, in the carrier's freight house, or in the consignee's warehouse, to misplace a very important package.

This is a very important feature of the container method of handling less-than-carload freight. The elimination of lost, strayed, or stolen packages will mean a saving in time, money and annoyance for all, but this is by no means most important.

Please note the picture on the screen.

I could follow this picture through and show you where a package shipped by the present method of handling less-than-carload freight must be handled 13 times from the warehouse or shipping room of the shippers, to the warehouse platform of the consignee. This is not a local condition in any one freight house, or on any one railroad, but is general.

This picture does not show the numerous checks and records necessary. By the container system, instead of handling each package 13 times, by man power, it is handled only twice, saving 11 handlings and assuring a 100% delivery of the shipment to the consignee in the condition that it is put in the container by the shipper.

Here is a picture of a container loaded with United States mail. I am showing this picture to illustrate how it is possible to load these containers 100%. Assuming for the sake of argument that a carload of less-than-carload freight weighs 20,000 pounds. By referring to a picture I have shown you, you will note that each package must be handled 13 times or man power must be provided for handling 260,000 pounds. By the container system the same amount of freight would be handled by man power twice, or 40,000 pounds, showing a saving in man power of handling 220,000 pounds for a single carload of 20,000 pounds of freight. With the scarcity of this class of labor, and there seems to be no chances for relief in the near future, this saving in man power is a very important item, and should not be lost sight of. There will be other expenses incident to handling of the containers which would be very small as compared with the handling of the freight by the present method.

When the container is loaded at the shipper's platform, it should be lifted with hoists to truck and from truck to the car and at destination by hoists from the car to the truck and from the truck to the consignee's platform, thus quickly releasing equipment, both truck and car.

Can you imagine the advantage of unloading a carload of LCL freight in about 10 minutes, thereby releasing the rolling stock for further service? This is being done today in the handling of less-than-carload freight by the container method. You can also imagine what it means to be able to unload a truck anywhere up to 7,000 pounds of freight in a couple of minutes.

This is not a supposition or something that can be done in the future—it is being done every day.

This picture shows a container being lifted from the car to the truck. This takes about one minute, and if they are slow, about a minute and a half, to load the truck, and the same time to unload it.

We are handling U. S. mail in containers between New York and Chicago every day. These cars have eight containers and in less than 10 minutes after the cars arrive in Chicago, the mail is all loaded on trucks and on its way to the different post offices or other rail connections. The same

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dispatch can be accomplished in the handling of freight.

This picture shows one of the cars in mail service which is loaded and unloaded in about 10 minutes.

This is a close-up view of the mail car and shows a good deal of the detail and construction of the containers.

Here is the same car with some of the containers removed. I am using this picture to bring out some of the detail, and call attention to the guides on the side of the car inside. The shoes on the containers slide between these guides. This is the only fastening that is necessary to hold the containers in place and it is not necessary to have a full carload in order to keep them from shifting.

This picture shows the container itself. I call attention to the shoe in the low right hand corner, which engages the guides on the car side.

I call attention to this picture to illustrate the security of any shipment made by the container method. Please note that the bottom of the door is below the top of the sides of the car, making it impossible to get into the container without first lifting the container from the car. This makes the container absolutely pilferage proof.

This picture shows how we are handling mail by the container method in New York. It would also illustrate the method of handling freight. The container is lifted by cranes from the car to the truck and by hoist from the truck to the platform and is moved on the platform to the point where it is to be loaded by an electric tractor.

We had one of these cars in the express service, operating between New York and Chicago, for over a year, without one claim for loss or damage to express matter. I think this is quite a record. The car made one round trip every week.

The possibilities of the container system of handling less-than-carload freight are far-reaching when you look into the future.

Although it could be said the shippers or consignees are not equipped with either trucks or hoists to handle the containers, when we first started to carry freight by rail and for a considerable time thereafter, industrial track facilities into factories were not provided, but instead freight was hauled between the railroad and the factories by teams. Then somebody conceived the idea that if they had a railroad track running into their plant they could handle their freight cheaper and with less delay. Today the first thought a manufacturer gives to the building of a new factory is railroad facilities. Now, it would seem that shippers of less-than-carload freight and the consignees, knowing the advantage of the container system of handling this class of freight, would give consideration to the handling of containers by providing necessary means for loading and unloading the containers to and from trucks at their warehouse. The shipper and consignee then will have the advantage of full carload shipment for less-than-carload freight.

I am showing a picture of a way-bill and other papers of a shipment weighing 6,241 pounds, shipped from New York to Buffalo, all to the same consignee. This is a lot shipment, consisting of some seventy separate packages. In order to transfer this 6,241 pounds of freight from New York to Buffalo it had to be handled by man power thirteen times from the time it left the packing room of the shipper until it reached the warehouse of the consignee, and in addition to this common labor, the making and handling of the records necessary for this shipment required a lot of clerical work. If the labor of handling less-than-carload freight and the number of records can be reduced, something has been accomplished and by the container method it is reduced and something is accomplished.

In addition to handling mail and express in less-than-carload freight there are other commodities handled by the railroad where the containers should play an important part. This concerns the handling of liquid, edible oils, acid and fruit juices, and especially milk that can be handled in bulk and where the temperature is an important factor.

THE L. C.

On the New York Central we are experimenting in the handling of milk in glass-lined tanks, encased in an insulated container, a line drawing of which is shown in this picture. Note the container around the tank is insulated, making it unnecessary to provide ice in the carrying of milk to keep it cool. The insulation around the tank also prevents the milk from freezing. During the cold weather this container tank brought milk to New York in extremely good condition while, during the same night, milk came in regular 10 gallon cans and some of it, upon arrival, was frozen. This you all know does not help milk.

This picture shows one of the containers being placed in the car. The tanks in these containers hold 825 gallons or equal to 82½ of the regulation 10 gallon cans. These containers may be unloaded from the car and placed on an auto truck in from a minute to a minute and a half. To transfer the same amount of milk between the truck and railway car in the standard 10 gallon cans would require more than one hour of manual labor.

STORY.

This picture shows the top of the glass lined tank with the latch opened. The milk is put into the tank through a small round opening in the lid. This has a pipe extension to the bottom of the tank and is connected with standard sanitary fittings to the supply tanks at the depot. The milk is discharged out of the bottom of the tank. These milk tanks can be made to any capacity, 600, 800, 1,000 or 1,500 gallons or more, depending entirely upon the capacity of the truck and the load limit of the highways.

An important feature of the container system is its adaptability to water transportation. Let us take for example a shipment of expensive material from China having a destination in New York. There is no reason why the container system could not be extended to a shipment of this kind, it being loaded in China, placed in a boat, transferred at San Francisco, and by rail to New York, with the container unopened and the contents not touched. Such interchange with foreign countries is a possibility in the future.

Some of the advantages which I can claim for the container method of handling the several commodities referred to are:

First, Elimination of extensive boxes and crates;

Second, To have containers of dimensions that will suit the largest number of shippers;

Third, One that is strong enough to be properly handled;

Fourth, One that will protect the lading from the elements;

Fifth, One that can be economically carried both on the truck and car;

Sixth, One that will save the shippers, the consignee and the carrier the annoyance of having packages lost or damaged enroute;

Seventh, One that will lessen the number of handlings by man power of the freight;

Eighth, One that will have a tendency to decrease rather than increase the expense of the transportation of freight;

Ninth; One that will save money for the user and carrier.

PRESIDENT: Gentlemen, the paper which you have just heard presents a new phase in transportation and we would be glad to hear from any members or visitors discussion of the subject or questions you may desire to ask.

MR. C. O. DAMBACH: Have you had any difficulty in checking claims for rough handling? If there is damage by rough handling, I wonder how you locate the responsibility.

MR F. S. GALLAGHER: We had one shipper say he had some freight damaged in one of the containers, but this was on account of it not being properly supported inside. On account of the rate in the tariff, the railroad company is not responsible for material after it is put in the container unless it has been in a wreck or something of that kind. I am not entirely familiar with the case in question, but I know we have not paid any claims on anything in a container yet.

MR. C. O. DAMBACH: A short time ago one of our mechanical men showed the Club how badly some cars were handled. Suppose those containers were handled in that way.

MR. F. S. GALLAGHER: I would not say that the container system of handling freight would eliminate rough handling, but there is this about it—they put their own freight in there and it is seven feet wide, that is all the movement it has to damage itself. The damage will be a great deal less under the same handling than we have in the regular box car today because the possible movement will be so much less.

MR. C. O. DAMBACH: Railroads are having a great deal of trouble with broken eggs and some of the railroads make the consignee inspect the shipments at the railroad station. If you get up against a condition like that with the containers, how are you going to take care of it?

MR. F. S. GALLAGHER: I dont' know, unless we had it made before it got there.

MR. SAMUEL LYNN: Mr. Chairman, as I understand the system as explained by Mr. Gallagher the containers move right to the consignee from the consignor, and what I would like to know is, when a wholesale house that is getting a consignment of say silks for the retail trade, what does the wholesale house do with the empty containers? In other words, how do they get it back, as the consignment to the wholesale house would go to the retail trade and the wholesale house would probably not have a return shipment? Would this not result in a congestion of empty containers at one end of the route or the other, working under such a system?

MR. F. S. GALLAGHER: The scheme of the container would have to be exactly the same as the scheme of the box car today. We get the box car loaded and it has to be gotten back empty. You can never get away from one-way movement. We have traffic at times when the cars are all coming east, at other times they are all going west. If the container is taken away and unloaded, it is the consignee's duty to return it, and he will do it because there is a demurrage charge on the container the same as on the box car. I do not think we will ever get an equalization of our shipments any more than we do with the box car today, and the container is nothing more or less than a small box car.

MR. A. E. ANDERSON: Have you had any experience where you put a car on a siding that there would be as many houses to take containers from that siding as there would be containers in the entire car?

MR. F. S. GALLAGHER: No.

MR. A. E. ANDERSON: How would you transfer containers into the various warehouses?

MR. F. S. GALLAGHER: That is really two questions. The Colgate people, I think it was, wanted us to give them a container car to operate between (if I remember correctly) Louisville and Jersey City. They did not want that car because it was a container car or because it offered them more security, but they wanted it becaues they could save their packages. That would be from their warehouse to their warehouse in carload lots.

The scheme of getting containers, if you have several consignees, is by combination with the trucking companies or the consignee having their own trucks to take the containers to their own plant. The container is being used very successfully by the United Cigar Company between New York and Buffalo, the United Drug Company and two or three candy companies. They load the container at their warehouse. It is brought over by truck and placed on the car and at the other end taken from the car and to their warehouse again. I do not know that we have one where they have a crane yet, though one company in Buffalo is meditating installing a crane and they are willing to haul from Brooklyn to 30th Street to get this protection for freight shipments.

MR. A. E. ANDERSON: You showed a picture of an empty car. In an emergency could any use be made of that car for ordinary shipments?

MR. F. S. GALLAGHER: Yes, in the freight car. In the passenger car we left the floor out because we did not want to take any chance of delaying the mails to scoop snow out of the car.

MR. A. E. ANDERSON: The ordinary gondola could be used?

MR. F. S. GALLAGHER: Yes. All you want to look out for is to have width enough to take care of the width of container and it would have to be fitted with guides to keep the container in place. The container car should not be confuesd with the ordinary open top car because it has to have proper guides in the car to keep the container from shifting and keep it in proper position.

MR. FRANK J. LANAHAN: As a matter of safety, how do you lock these containers? The picture you exhibited showed that the container would have to be lifted before the door could be opened. Is it locked with a key and is it turned over to the shipper or is it sent by the railroad to the consignee?

MR. F. S. GALLAGHER: In fact, we do not use a lock at all. We put a seal on the container just the same as on a car door and when the container is in the car, the bottom of the car door is back of the side of the car and that is what makes it secure. The lock is not necessary. The U. S. Post Office Department thinks so much of it that they send as much of their registered mail in the containers as they can.

MEMBER: What is the net weight of the six containers containing that class of freight?

MR. F. S. GALLAGHER: The containers themselves weigh 3,020 lbs. The net weight of the commodity in the containers of the class you spoke of, United States mail, probably averages from 3,000 to 7,000 lbs.

MEMBER: That is against a total capacity of 80,000 to 100,000 of a box car. That shows the comparison. Two years ago the New York Central people had an exception to the classification covering freight in those contatiners between Chicago and Cleveland. I assume that those gondolas are 100,000 capacity. Would you say that the average weight of the lading in six containers was ten tons of merchandise freight?

MR. F. S. GALLAGHER: I would not want to make that statement because I do not know.

MEMBER: That is how you make the comparison between the containers and the box cars.

MR. F. S. GALLAGHER: There is more to be considered than just box car and containers. What I have been working on for quite a number of years is the saving of labor, trying to reduce the man power expenditure.

MEMBER: In making shipments in containers, do you charge ordinary L. C. L. rates or do you make an extra charge for the container in addition to the L. C. L. rate?

MR. F. S. GALLAGHER: I am not thoroughly familiar with the tariff on that, but I do know that there were six classes combined into one and I think the rate is third class and the shipper can put in anything from the first to the sixth.

MEMBER: Do you make an extra charge for the container in addition to the ordinary classification?

MR. F. S. GALLAGHER: No, sir.

MEMBER: Have you any containers coming into this section?

MR. F. S. GALLAGHER: No, not here.

PRESIDENT: Is there any further discussion?

MR. FRANK J. LANAHAN: Within the year, a great many audiences in America have been entertained by the famous Celtic pair of Gallagher and Sheen. It has been the good fortune of the Railway Club here tonight to be instructed by another team, equally good in their line, Messrs. Gallagher and Horn.

The discourse from the distinguished foreigner, the narration of his personal experience, his contact with the various classes making up the social strata, is interesting in the extreme, and while he claims to have no panacea for all the evils of the day, he suggests many golden nuggets that if systematically distributed and properly alloyed will go a long way toward settling industrial problems and cure social unrest.

It is most fitting that a vote of thanks be extended by this body as a tribute to the trials and tribulations, as well as to the triumphs, of the gentleman who first addressed us this evening. I am sure we would all be gratified if Mr. Horn were to carry away with him the knowledge and the satisfaction of knowing that he had met with a sympathetic and enthusiastic audience and one that wholly appreciates what he has passed through and what he is endeavoring to do for the good of his adopted country. I move you that this be shown by all rising.

(The motion was duly seconded and carried by a unanimous rising vote.)

MR. FRANK J. LANAHAN: To the other member of the team, Mr. Gallagher, are we indebted for the instructive talk relating to the novel method of transportation, L. C. L. shipments. He certainly has set us all to thinking. What he has presented tonight is entirely new and all have enjoyed listening to his presentation of the subject. A vote of thanks is due Mr. Gallagher and I move you that this be extended to him by all rising.

(The motion was duly seconded and carried by a unanimous rising vote.)

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

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WILLIAM E. BRUMBLE
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J. B. YOHE, JR.
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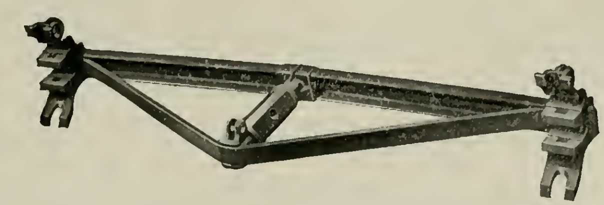

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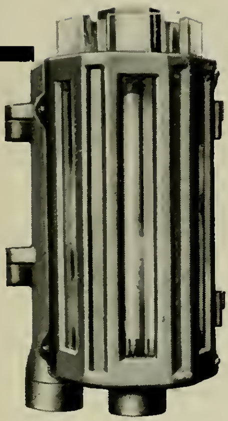

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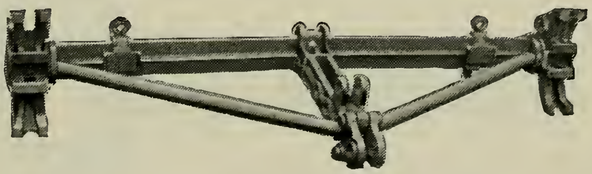

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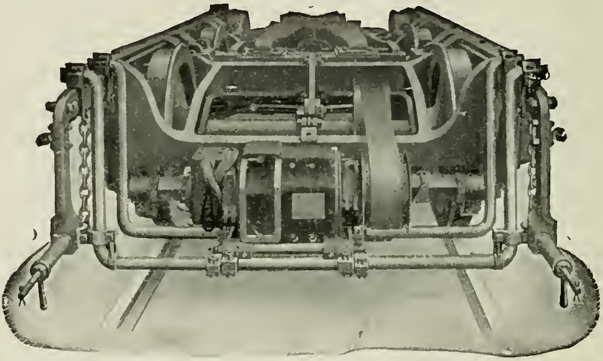

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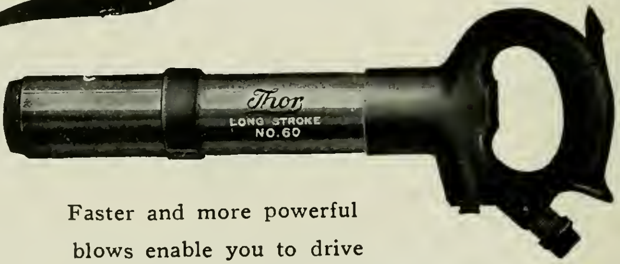

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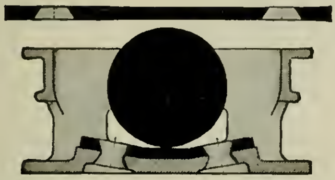

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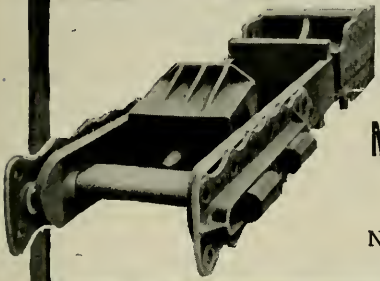

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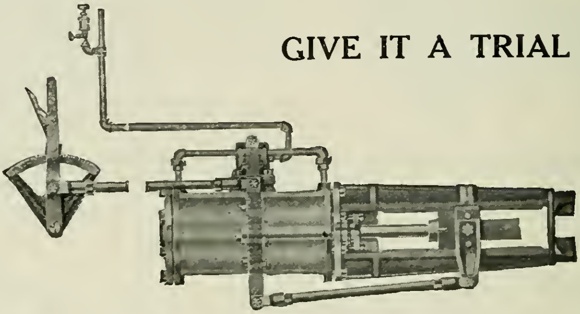

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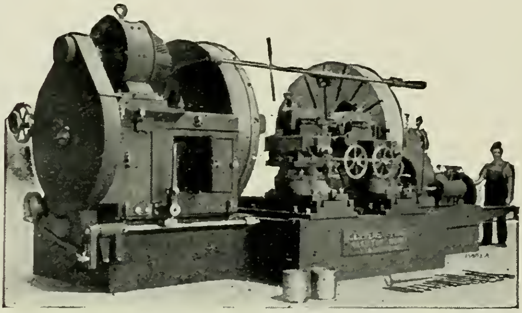

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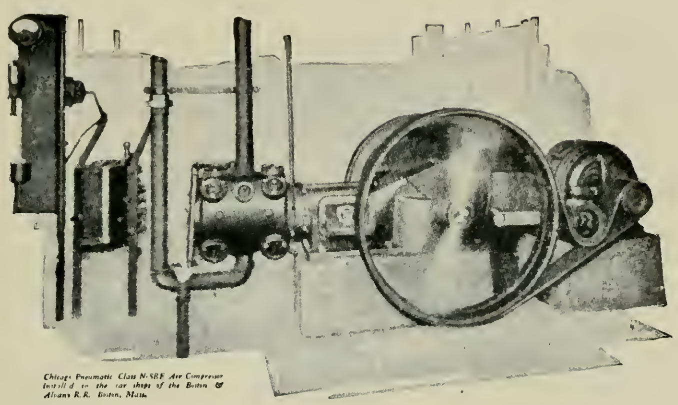

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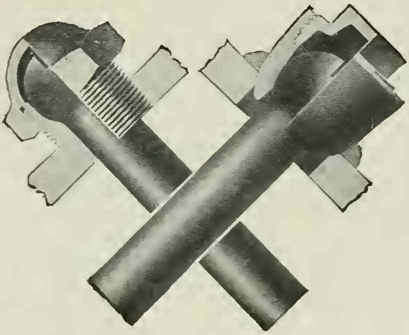

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Pittsburgh, Pa., May 24, 1923
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F. H. STARK	November, 1905, to October, 1907
*H. W. WATTS	November, 1907, to April, 1908
D. J. REDDING	November, 1908, to October, 1910
F. R. McFEATTERS	November, 1910, to October, 1912
A. G. MITCHELL	November, 1912, to October, 1914
F. M. McNULTY	November, 1914, to October, 1916
J. G. CODE	November, 1916, to October, 1917
D. M. HOWE	November, 1917, to October, 1918
J. A. SPIELMAN	November, 1918, to October, 1919
H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921
SAMUEL LYNN	November, 1921, to October, 1922

*—Deceased.

Meetings held fourth Thursday of each month except June, July and August

PROCEEDINGS OF MEETING
MAY 24, 1923.

The meeting was called to order in the English Room, Fort Pitt Hotel, Pittsburgh, Pa., at 8 o'clock P. M., President D. F. Crawford in the chair.

The following gentlemen registered:

MEMBERS

Abel, A. W.
Adams, W. A.
Anderson, A. E.
Anderson, G. S.
Ashcraft, E. J.
Barrett, R. L.
Beach, H. L.
Berg, K.
Blakley, T. M.
Bonhoff, E. L.
Borg, J. E.
Bradley, W. C.
Burel, W. C.
Burke, George C.
Buser, Fred F.
Caldwell, C. R.
Campbell, J. T.
Carbis, X. J.
Carothers, C. G.
Carpenter, H. D.
Carson, John
Cartwright, Wm. E.
Chittenden, A. D.
Christy, F. X.
Clark, Chas. H.
Conlon, John F.
Conway, J. D.
Cooper, C. E.
Cooper, Harry
Courtney, H.
Crawford, D. F.
Cronin, M. F.
Crouser, Claude S.
Cunningham, J. L.
Dambach, C. O.
Darrah, C. B.
Davison, Chas. R.
DeVilbiss, E. B.
Donovan, J. J.
Down, S. G.
Dunn, Samuel O.
Emery, E.
Fair, Chas.
Fowler, W. E., Jr.
Freshwater, F. H.
Fults, J. H.
Fults, J. J.
Goda, P. H.
Gowland, S. I.
Greene, W. F.
Gross, Chas.
Guignon, W. E.
Haines, W. L. R.
Hale, C. E.
Hansen, Wm. C.
Harger, M. L.
Headington, R. V.
Henry C. L.
Hershey, R. W.
Holmes, E. H.
Howe, D. M.
Huber, H. G.
Huchel, Wm. J.
Hultman, Carl
Hussong, A. C., Jr.
Johnston, W. A.
Jungbluth, Adolph
Kearney, J. W.
Kindle, W. F.
Kranse, Harry A.
Kroske, J. F.
Kummer, Jos. H.
Lanahan, Frank J.
Lanahan, J. S.

Lent, John F.
Lilley, C. S.
Livingston, E. M.
Lohr, Allen W.
Long, H. P.
Lower, N. M.
Lynn, Samuel
Maliphant, C. W.
Matchett, H. K.
Merscher, John
Meschter, E. F.
Millar, C. W.
Miller, John
Moyer, Oscar G. A.
McNulty, F. M.
Newman, J. F.
Noble, Jesse A.
Noonan, W. C.
O'Brien, M. J.
Orchard, Chas.
Padfield, Archie
Painter, Joseph
Patterson, J. E.
Price, W. F.

Rauschart, E. A.
Renshaw, W. B.
Redding, D. J.
Redding, R. D.
Reynolds, Dave
Rogers, Robert
Sattley, E. C.
Schrecongost, C. P.
Seiss, Wm. C.
Severn, A. B.
Shannon, David E.
Simpson, Robert
Snyder, J. W.
Stark, F. H.
Stevens, L. V.
Stoller, Karl M.
Stucki, A.
Taylor, H. G.
Thomas, C.
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Thompson, L. D.
Warrensford, Fred S.
Wright, John B.
Zilian, Ralph F.

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Shellenbarger, H. M.
Sinclair, J. J.
Smith, Sion B.
Walters, E.
Westwood, G. T.
White, Arthur H.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Cooke, D. C., Special R. R. Rep., Chicago Pneumatic Tool Co., 6 East 44th St., New York City. Recommended by W. J. Murphy.

Hughes, J. E., Supt., P. & L. E. R. R., 123 Maple Terrace, Pittsburgh, Pa. Recommended by Samuel Lynn.

Schwab, Charles, Clerk, Purchasing Dept., Penna. System, Room 301, 1013 Penn Ave., Pittsburgh, Pa. Recommended by C. R. Caldwell.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

Announcement was made of the death of Mr. Scott R. Hayes, assistant to the President, New York Air Brake Company, died May 6, 1923.

PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

Is there any further business to come before the meeting? If not, we will proceed to the address of the evening. I do not know of any problem in the United States that is more important at the present time than that of the status of the railroads. For some reason or other, the railroads apparently do not seem to be a part of the United States. They seem to be something that every hand is raised against. Instead of our people realizing the importance of the transportation system and helping to upbuild it, there seems to be a tendency to tear it down. Therefore, an address on "The Future of the Railroads" is particularly apropos. We will have the pleasure this evening of listening to one who is thoroughly competent to speak on the subject, one who has made a study of the problem, not only in this country but abroad. It gives me great pleasure to introduce to you Mr. Samuel O. Dunn, Editor of the Railway Age.

"THE FUTURE OF THE RAILROADS"

BY SAMUEL O. DUNN.

Mr. President and Gentlemen of the Railway Club of Pittsburgh:—I accepted some time ago the invtiation to come over here and address you at this time, and the other day I received a telegram from John Conway, asking me to wire him what my subject was going to be. It was necessary for me to answer that telegram before I had thought very much about what I was going to say. I wired him that the subject would be "The Future of the Railroads." He told me today that he was sure an address upon that subject would be very interesting because there were a good many people who were curious as to what the future of the railroads was going to be and who would be glad to be informed on the subject. I told him it was a case of having to name the baby before it was born. I did not know whether it was going to be a boy or a girl.

This address will probably be concerned more with what I conceive to be the means which ought to be used in determining the future than with the prophecy as to what that future is going to be.

I do not come before you entirely as a stranger. I addressed this Club on a previous occasion a few years ago and the Club at that time did me the honor to make me an honorary member, and I believe I am one of those who are in good standing as a member without costing him anything to stand. I am very glad indeed to be back to greet my fellow members of this Club.

For several years there has been going on in this country a great struggle to determine the future of our railroads. Many believed this struggle was practically ended when the Transportation Act was passed and the railways were returned to private operation in 1920. It seems probable that if general business had stayed good for some years after that the railroad problem would not again have become acute for a long time. Public sentiment had turned strongly against government operation. The wages of railway employes were advanced in 1920 to the highest level ever known and they were fairly well satisfied. The advances made in passenger and freight rates probably were sufficient to enable the railways, with efficient operation under favorable business conditions, to enjoy reasonable prosperity. Rates were not advanced as much in proportion as the prices of commodities had increased and if there had been no large decline in prices all traffic could easily have borne the rates fixed, and shippers would have had little ground for complaint regarding them.

But in the very months in 1920 when railway rates and wages were being advanced, there was beginning the greatest decline of prices in history, and it was followed by a profound business depression and the greatest decline of railroad traffic ever known. For 15 years previous to 1920, the prices of commodities of all kinds had been steadily and in the latter years in this period, very rapidly increasing. During most of these years railway rates had not been advanced at all and the advances in freight rates in 1920 made them only an average of 78 per cent higher than before the war, while the average wholesale prices of all commodities was 126 per cent higher. But the sudden perpendicular decline of prices made prices relatively lower as compared with freight rates than before the war.

There immediately arose from all classes of producers and shippers a demand for reductions of freight rates. The farmers of the country, and especially the grain farmers of the West, suffered with especial acuteness from the decline of prices, and therefore their demands for reductions of rates were especially strong and insistent.

The enormous and unprecedented decline of railway traffic, coming as it did when railway operating costs were at the maximum, threatened the whole railroad industry with bankruptcy. It was impossible immediately to make reductions of railway wages and other operating costs in proportion to the decline of prices. Therefore, it was impossible to make reductions of rates in proportion to the decline of prices without financially destroying our railroad system. The necessity of making some reductions of wages, and the impossibility at the same time of reducing rates as demanded by the producers and shippers, and especially the farmers, fertilized wonderfully the field for anti-railroad propaganda. The opportunity presented by the discontent of both labor and the shippers, especially of the farmers, was immediately seized upon by every class of persons who for any reason were hostile to private management of railroads. A propaganda was begun against the way the railways were managed, and against the Transportation Act, under which they were returned to private operation, which, in malevolence, in comprehensiveness, in the mendacity of many of the charges made and the plausible fallaciousness of the arguments used, has never been equalled by the propaganda carried on against any industry or legislation in this country.

The result is that we are again in the midst of the struggle to determine the future of the railroads. The present stage of this struggle probably will last at least until the date of the national presidential election in 1924. The final outcome will be determined by public sentiment.

My observation is that people living in the Eastern part of the country are disposed to under-estimate the amount of public sentiment dangerous to the railways which exists at the present time. The reason undoubtedly is, that this sentiment is most prevalent in the Central Western and Northwestern states. It is not difficult to understand why it prevails chiefly in those parts of the country. The farmers in those territories have suffered most and are suffering most now from the effects of the decline of prices which occurred in the latter part of 1920 and the early part of 1921. Those are great grain producing territories and the prices of grain within the last two years have been relatively extremely low compared with the prices of most other commodities. A few months ago it appeared that this condition was remedied by changes which were reducing the wide disparity between the prices of Western farm products and the prices of most of the things the Western farmers buy and business conditions and sentiment in the West were improving. Within recent months, however, the tendency of the prices of Western farm products has been to decline, while the prices of most of the things the farmer must buy have been increasing. Now, railway rates in Western territory have been advanced less since the war than in any other part of the country, but for over 40 years it has been a tendency of Western farmers which has been sedulously stimulated by demagogic politicians to lay most of the blame for their troubles upon railroad rates. The large number of extreme radicals elected to Congress in the Western states last fall indicated the sentiment which prevailed among the Western farmers then and which, to a lesser, but ominous, degree still prevails among them.

But public sentiment regarding any great public question does not spring up spontaneously. It is what it is made. It is made partly by conditions. It is made partly by the presentation to the public of facts—or what are represented to be facts—and of arguments. The public sentiment regarding the railroads which had prevailed in the past and which prevails now has not come into existence spontaneously or by accident. It has been made by the way the railways have been managed and by what has been said and written of the way in which they have been managed. It will be made in future in the same way.

Why has there prevailed so often and so long a public sentiment hostile to the railroads? This has been mainly due to the facts, first, that railway officers in their management of the properties have not given enough consideration to the effects that would be produced upon public sentiment by what they did, and, secondly, that the officers of the railways and other persons affiliated with the railways in interest, have allowed critics of railway management to occupy most of the field of public discussion of railway matters.

If government ownership of railroads is to be avoided—if the railways, under private management, are to be allowed to prosper, thereby making it possible for the entire business of the country, and especially of those who sell chiefly to railroads, to prosper—then, there must be created and maintained a better public sentiment regarding the railroads. As I have reflected upon the matter I have felt increasing surprise at how little real appreciation of this fact has been shown during the last 15 years by those who are most directly and vitally concerned. The railroad industry of the country has been, during most of this period, getting into worse and worse condition financially. This has been due chiefly to a public sentiment which has demanded and enforced a policy of government regulation which, with the exception of occasional years, has caused narrower and narrower restriction of the net return earned by the railways. It has been a popular sport of railway officers and some classes of business men to denounce regulating commissions and politicians because of this policy of regulation. But this policy has been adopted and carried out by regulating commissions and politicians because public sentiment has demanded and approved it. Persons simply deceive themselves who think otherwise. Politicians, regulating commissions and, in the long run, even the courts do what they believe the public wants done, and they usually know pretty well what the public does want done.

This policy of regulation has been quite as injurious to the railways as dishonesty and inefficiency on the part of their managements would have been.

But while all railway executives constantly have sought to promote the strictest rectitude and the greatest practicable efficiency in the operation of the properties in their charge, many railway executives have done extremely little to promote the creation of a public sentiment in their territories which would tend to cause the railways to be so regulated as to enable them to make profits in proportion to the integrity and efficiency of their operation. While the large financial interests that represent the owners of the securities, and control and direct the management of many railways, have insisted on honest and efficient management, they have done very little to help improve public sentiment regarding the railways. The railway equipment and supply companies of the country have suffered severely from reductions of the purchases made by the railways which have been caused by the way they have been regulated, but, excepting for the support given to the excellent work done by the Railway Business Association, many of the largest railway equipment and supply companies of the country have done little or nothing to improve the public sentiment which has caused this regulation. Some of us who long have been very actively engaged in the struggle to secure better regulation of railways and who, at the same time, have observed the merely platonic interest taken in this struggle by many of the great manufacturing concerns that are dependent for their business upon the railway market, have sometimes been led to speculate whether the managements of many of these large manufacturing concerns, some of the most important of which are located in the Pittsburgh district, realized that it was just as much their battle as that of the railroads that was being fought out, and to wonder when they would awaken to an appreciation of the fact that the outcome of this struggle will determine not only the future of the railroads, but also that of all the affiliated industries that are chiefly dependent upon the railroads for their market.

What is the principal immediate issue in this struggle? It may be stated in a very few words. The principal immediate issue, the vital issue, is the question of what net return the railroads of the United States shall be allowed to earn.

What is net return in the railroad business? It is the same thing as net return in any other business. It is what is left out of the earnings after operating expenses and taxes have been paid. It is that part, and the only part, of the earnings which is available for paying interest and dividends to investors and for making improvements.

The Interstate Commerce Commission is making a valuation of the railroads as a permanent basis for regulating their rates. For use until the final valuation has been completed, it has placed upon the railways a "tentative valuation," which now amounts to $19,500,000,000. It has held that for the present they are entitled to fix rates and make total earnings which will enable them to pay their operating expenses and taxes, and have, in addition, an average net return of 5¾ per cent upon this valuation.

The making of this valuation is the result of the iteration and reiteration for many years of the charge that the railways are enormously overcapitalized. In 1913 Senator LaFollette of Wisconsin secured the passage by Congress of a law directing the Interstate Commerce Commission to make a valuation of all the railways. In 1920 Congress, in passing the Transportation Act, in effect directed the Commission to base the advances in rates, which it was known would be necessary when the railways were returned to private operation, upon a tentative valuation, and in making this tentative valuation to use all the information it had thus far gathered in carrying out the provisions of the LaFollette law.

The final valuations of numerous individual railways which have thus far been published, and the tentative valuation placed upon all the railways, have grievously disappointed the expectations of Senator LaFollette and others who joined with him in getting the original valuation law passed. In consequence, they have attacked some of the final valuations which have been placed on the individual railways, and also the tentative valuation placed on all the railways, and have charged especially that the tentative valuation is excessive. It has even been charged that it is excessive to the extent of seven to ten billion dollars. They are seeking to get it reduced either by the passage of new legislation, or by exerting political pressure upon the Interstate Commerce Commission. The so-called "progressive bloc" in Congress has called a meeting to be held in Chicago this week for the purpose of taking steps to get the valuations of the railways scaled down.

Many people believe, and radical labor leaders and politicians diligently encourage the belief, that the valuation finally placed upon the railroads will have a very important effect upon the total rates they will be allowed to charge. This is not true. The railways at present are paying out in operating expenses and taxes 85 per cent of all the earnings they derive from the rates they charge. This means that so long as present operating expenses and taxes prevail they will have to continue to collect from the public at least 85 per cent of the present rates merely to pay operating expenses and taxes, absolutely regardless of what valuation is placed upon their properties.

The valuation finally made will affect only that part of the rates and earnings that constitute the net return of the railroads. Now, the net return at present amounts to only about one-seventh of the total earnings. In consequence a reduction or increase of the valuation will have little effect upon the rates the public must pay. An increase or a reduction of one billion dollars in the valuation now tentatively placed upon railway properties would affect the total passenger and freight rates the railways are allowed to charge by less than 1 per cent. A change of five billion dollars upward or downward in the total valuation would affect the total rates they are allowed to charge by about 4 per cent.

But while the valuation finally made will have relatively little effect upon the total rates the railways will be allowed to charge, it will have a most important effect upon the net return the railways will be allowed to earn, and therefore on the interest and dividends they will be able to pay and the additions to and improvements in their properties they will be able to make. This is because the net return they are allowed to earn is based entirely and solely upon the valuation fixed, and therefore every increase or reduction of the valuation will increase or reduce the net return allowed to be earned in the same proportion. For example, a reduction of say $3,000,000 in the valuation would reduce the rates the public would have to pay at the present time less than 3 per cent; but it would reduce by almost 16 per cent the net return the railways would be allowed to earn. A reduction of $7,000,000 in the valuation, as advocated by Senator Brookhart of Iowa, would save the public less than 6 per cent in rates, but would reduce the net return the railways would be allowed to earn by about 37 per cent. The valuation that should finally be made is properly a matter for determination, first, by the Interstate Commerce Commission, and, secondly, by the courts, not by arbitrary legislation, as proposed by radicals. But while the decisions of commissions and courts will determine theoretically what net return the railways ought to be allowed to earn, they will not determine how much the railways must earn in order to provide the country with adequate and satisfactory transportation. That is a matter which will be determined, not by legislation or by decisions of commissions and courts, but by economic laws and conditions.

Now, regardless of the technicalities of the subject, it is a comparatively easy matter to estimate how much net return the railways must be allowed to earn in future if they are to be able to provide adequate and satisfactory transportation. The Interstate Commerce Commission has placed upon railway properties a tentative valuation which now amounts to $19,400,000,000, and has held that a fair return upon this valuation would be 5¾ per cent annually. A return of 5¾ per cent upon this valuation is roughly equivalent to a return of 5½ per cent upon the investment in property shown by the railway companies' books. Now, in the ten years before this country entered the war, there were five years in which the railways earned an average of about 5½ per cent upon their property investment, and the earning of this net return resulted in an average annual investment of about $700,000,000 in new railroad facilities. There were five other years in that period of ten years when the railroads earned an average of about 4½ per cent on their property investment, and the earning of this return resulted in the making of an average annual investment in new facilities of only about $400,000,000. In other words, before the war whether the railways earned an average of 5½ per cent or 4½ per cent annually on their property investment made a difference of over 40 per cent in the average new investment made by them annually in new facilities with which to render more and better transportation service. There is no reason whatever for doubting that the same causes would produce the same effects in future.

It was estimated by the Joint Commission of Agricultural Inquiry of Congress in the report on "Transportation" made by it in 1921 that "at least $750,000,000 per annum" in new investment should be made by the railways for several years in order to remedy the great and increasing shortage of transportation. Other authorities have estimated that the annual new investment made in railroads should be over a billion dollars a year. It is by no means certain that if the railways are allowed to earn in future an average return of 5¾ per cent upon a valuation equivalent to that now placed upon them by the Commission, they will be able to raise all the new capital required adequately to increase their facilities. But one thing is certain. This is that if a substantially lower valuation than the present one is placed on the railways, and the net return they are allowed to earn is correspondingly reduced, they will not be able to raise the new capital and make the enlargements and improvements in their properties necessary to enable them to handle the country's increasing commerce.

The question will naturally arise in the mind of any man who has not carefully followed the course, and studied the motives and purpose, of the propaganda against the railways which has been carried on for some years, and especially since they were returned to private operation, as to why the attacks upon them have been and are being concentrated upon their capitalization and valuation, and especially upon their net return, when it is so easy to show that the net return they are allowed to earn has relatively little effect upon freight and passenger rates.

This is partly due to the ignorance of many people who participate in these attacks. They sincerely believe that the railways are overcapitalized and overvalued, and that "squeezing out the water" would cause a large reduction of rates.

But this it not the reason why most radical public men and labor leaders concentrate their attacks upon the net return. They do not attack the wages of railway employees, which constitute most of the operating expenses, because they want the support of railway employees. They do not attack the taxes levied on the railways, which for some years have amounted to more than the dividends paid by them, because it is in accordance with the general political and economic philosophy of all radicals that large business concerns and people of wealth shall be heavily taxed. They attack the net return of the railroads and seek to reduce it as much as possible because practically all of them are hostile to private ownership and management of railroads. They know that net return is the very life blood of every business. They know that the more of this life blood is let out of the veins of the railroads the weaker financially, and the less able to furnish the public adequate and satisfactory service they become. They know that the less able the railways become to render adequate and satisfactory service the more hostile public sentiment toward them will become and the sooner private ownership and management will be rendered impossible. The purpose of these men is to drive the railroads toward government ownership and to get placed upon their properties a valuation which will enable the government to acquire them for the smallest amount possible. These are the real reasons why the attacks of all the radicals upon the railroads are being concentrated upon their net return, and especially upon their valuation, upon which the net return is based.

Suppose, now, that by political propaganda and pressure upon the Interstate Commerce Commission they should succeed in securing a large reduction in the valuation, and a corresponding reduction in the net return the railroads were allowed to earn. By rendering it impossible for the railways to pay interest and dividends upon a large part of their existing stock and bonds, this would ruin many of the owners of their securities and imperil the solvency of numerous great fiduciary institutions, such as trust companies and life insurance companies, which are the largest owners of railway securities. It would render it impossible for most railways to raise new capital with which to buy new equipment and make improvements in their properties. This would cause a very large reduction in the purchases the railroads would be able to make, with disastrous effects upon the railway equipment and supply manufacturing industry of the country, and upon all the other industries, such as those engaged in the manufacture of iron, steel and lumber, which derive a large part of their business from the railroads. The inability of the railways to make the enlargements and improvements in their properties necessary to enable them to handle the country's increasing commerce would finally arrest the increase of all production and commerce. Those who for political purposes are seeking to secure a large reduction in the valuation of the railways are recklessly disregarding the plain economic facts of the situation. If the policies they advocate should be adopted some very small reductions of rates would be secured, at the cost of a great increase in the present shortage of transportation, of a drastic limitation of the country's production and commerce because of this increase in the shortage of transportation, and finally, of a great industrial and financial disaster due to the eventual stoppage of the growth of our production and commerce.

In the earlier part of this address I said that the outcome of this struggle over the railroad problem, which is essentially a struggle over the net return the railroads shall be allowed to earn, would be determined by public sentiment; that public sentiment is now what it has been made, and in future will be what it shall be made, and that the determination of what public sentiment shall be in future rests principally with railway officers and those who are affiliated closely with the railroads in interest. The number of those who are closely affiliated with the railroads in interest is much larger than is generally realized. They include all those who are engaged in the manufacture and sale of equipment and supplies used by the railways in operating, enlarging and improving railway properties. They include also a big part of the large financial institutions of the country, because they are large owners of railroad securities. If it be true that the shaping of public sentiment regarding the railways is largely in the hands of the officers of the railways and the officers of these other industrial and financial concerns, what then should they now be doing to help create a sound public sentiment?

First, railway officers should be sparing no effort to so operate the properties as to cause them to render the largest amount of service possible in the most satisfactory manner practicable. No better evidence of the energy and ability of the railway executives and officers of this country could be afforded than the way in which they have made the railways during the last nine months, handle a freight business largely exceeding any that was ever handled before, in spite of the handicaps resulting from the coal strike and the shop employes' strike. One of the best things ever done to improve public sentiment towards the railroads was done when the railway executives a few weeks ago met in New York and adopted a program for not only increasing the freight business handled to the utmost extent possible, but also for seeking the co-operation of the public in doing so and for constantly giving to the public information as to the results secured. For the railroads to render the public the most and best service they can, under such conditions as now exist and in addition to spare no effort to make the public know and understand what they are doing for it, is public relations work of the very highest order.

Secondly, however, the officers of the railways and of all concerns that are closely affiliated with the railways in interest, should be diligently educating themselves regarding the issues involved in the present struggle over railroad regulation and the facts bearing on those issued. There is no evading this struggle. It must be fought to a finish. Twenty-seven years ago we had a great political struggle in this country over the question of sound money. The outcome of that contest was largely due to the fact that the business leaders of the country took an intense interest in it and educated themselves regarding the matters in controversy.

Thirdly, they should be engaged in educating all classes of the people regarding the railroad question by every available means, and through every available channel. If the people are to be educated regarding this railroad question the initiative, the energy, and the money for carrying on a campaign of education must first be supplied by those most directly concerned, including the railroads, the railway equipment and supply manufacturing industry in all its ramifications, and our large financial institutions. Experience has plainly shown that public men of even conservative views will not squarely meet the attacks of the radicals upon the railroads unless those whose interests are most directly imperilled will first show the intelligence and courage to do so. It is expecting and asking too much to expect and ask public men to risk their political fortunes in a struggle with radicalism when business men who will lose the most if these attacks are successful will not themselves take a hand in the fight.

The two best and most readily available means of educating the public regarding any question are the spoken word and the written word.

Everybody cannot make speeches, but many can do so and anybody can inform himself as to the facts regarding the railroad question and use them to set his neighbors right.

In the sound money campaign of 1896 the large business concerns of the country placed literature regarding the money question in the hands of their traveling salesmen, and the traveling men of the country did much to win the battle for sound money. If every traffic representative, local attorney, local surgeon and station agent of the railways were made a walking delegate on the railroad question in his own territory or community, the results secured in educating public sentiment would be surprising. If every manufacturing concern which is dependent on the railroads for business, and every financial institution which owns or deals in railroad securities, would enlist its salesmen and other representatives in this struggle over regulation of railroads, the public sentiment regarding the railroads in many parts of the country would soon be greatly changed.

There is a great deal of literature advocating sound regulation of railroads being prepared. It is not being widely enough distributed and read. It is reaching only a small part of the people that ought to be reading it. There are many misrepresentations of railroads being published. They all ought to be answered, but a large part of them are being left unanswered. The great trouble is, there is a vast amount of work that needs to be done to educate the public regarding the railroad question, while there are very few people who are actually doing anything. When every man in this country who is directly concerned as to the outcome of this struggle over the railroads begins to take an active part in it, instead of sitting on the bleachers, like the crowds at a baseball game, and criticising the few men who are playing the game the best they can, we shall begin to make some progress in the education of public sentiment regarding the railroad question.

There is far more involved in this struggle over the railroads than most people seem to realize. The railroads are the first to meet the full force of the drive being made by radicals of all kinds against the existing industrial and political institutions of the United States. If the attempts being made largely to confiscate railroad property and to force the railroads into government ownership are successful, similar attacks will immediately be made upon coal mines, manufacturies and other forms of property. If you think this is not a serious matter, let me direct your attention to the condition of affairs in England. There the Labor Party is now the second strongest party in Parliament, and it is advocating a huge levy upon capital to pay the national debt, the nationalization of railroads, coal mines, shipping, land and every other kind of property which is used in the production or distribution of wealth, and the adoption of other measures which would destroy all private property and establish a socialist state.

The English are naturally a more conservative people than we are, and yet, because the very kind of propaganda with which the railroads are now being assailed in this country has not been treated seriously and combatted effectively in England, that country is today living under the imminent threat of the establishment of a labor-socialist government.

The propaganda being carried on against the railroads in this country is really only a part of the propaganda being carried on against all private property, and it is high time that all those who own property, or who desire to own it, should begin to participate actively in combatting this propaganda as a very important means to securing the right settlement of questions whose right settlement is essential to the welfare of all of us.

PRESIDENT: Gentlemen, the message we have just heard is one that we should all take to heart. I feel that as members of the Railway Club of Pittsburgh we should all start on the plan laid down by Mr. Dunn and each of us become an agent to bring out the facts. I for one feel that if the facts are brought out to the public, that public sentiment will be swayed so that in this country we may retain at least some of the rights that are still left to us, such as the right of ownership of property, the right to conduct our business in a business-like way.

We will be glad to have any discussion of this very excellent paper.

MR. D. J. REDDING: Many of the points made by Mr. Dunn in his paper tonight are well known in a general way by railroad men, although very few of them have devoted the time and study to the question necessary to be able to analyze the situation as is done in this paper. One of the fallacies which seems to be quite generally accepted by the public is that the railroads are guaranteed earnings of 5¾ per cent on their capital investment. Just a short time ago I heard that statement advanced in the smoking compartment of a sleeper, by a man who said he was a member of the Government Farm Board, and that he was a farmer by occupation. He put the question to the other men in the smoking compartment by saying: "Suppose a half dozen of us were to organize a wholesale grocery business, and after operating for a while we found either by bad management or high cost of operation we failed to earn dividends, could not pay the salaries of the employes, or pay our bills for supplies bought, what would we do? Naturally we would have to go into court, ask for the appointment of a receiver, or some of our creditors would attach our assets or put us into bankruptcy. In either case the affairs of the firm would be wound up, and we would be compelled to hunt some business where we could make a living. The railroads, however, are not required to handle their business in that manner. the government guarantees earnings of 5¾ per cent. If they do not earn that the government pays it over to them just the same."

I believe that this understanding is quite widely disseminated. I told this man that I thought he misunderstood the Transportation Act, and that to the best of my knowledge and belief, the railroads were not guaranteed 5¾ per cent or any other earnings on their capitalization. What the Transportation Act really did was if they earned more than 5¾ per cent, one-half of the surplus above that amount to be turned back to the government. If they failed to earn a living they could go to the wall as far as the government is concerned, and I think Mr. Dunn will bear me out in the statement that railroads are not guaranteed any definite earnings.

Then we all possibly recognize the fact that there is a tremendous lot of propaganda going on, not only for the confiscation of railroads, but on the whole labor situation as it exists today. I know of this propaganda in a district where a great many foreigners are employed in the mills. I was told that there were several men who had no visible means of support, but were in the service of some socialist organization. These men were devoting all their time to visiting with the foreigners at their homes and at their club houses, particularly on Saturday evenings and Sunday afternoons, when there is usually a large number of these men at their club houses. They were very bitter in their denunciation of private railroad ownership, and what they referred to as high-handed methods of mill owners and supervisory forces. One of the points which they harped upon was that many of these foreigners during the war were able to earn from $10 to $18 per day in the same shops where they are now earning $5 and $6 per day, and their story was that the difference in pay went into the pockets of the bosses, giving no consideration whatever to the fact that during the high pay period they were working at top speed on munitions, and that there had been a great change in the economic conditions of the country since then, but it makes a very impressive story as many of these foreigners earned this high salary during the war and are now earning the lower reward, and they do not know why there has been a reduction in their pay.

You will recall that Mr. Horn, who spoke before this club a month ago, said that a part of the story told by socialist organizations among the foreigners was that while in Russia they had one Czar to fight against, that in this country there were thousands of them, and they considered foremen and supervisors as small Czars who had it in their power to extract an excessive amount of toil for small earnings.

There is no question but that this kind of propaganda is nation wide and that little if anything is done to offset it, and the efforts of Mr. Dunn and others who are trying to throw some light on this subject cannot be too highly commended.

MR. A. E. ANDERSON: I think it is quite appropriate to have as a speaker on this occasion on this subject, because the future of the railroads looms up with a dark, dun color which these radicals, being more or less color blind, seem to consider as getting blacker and blacker. The fact of the matter is that the situation is serious. And Mr. Dunn has called attention to the policy which, Mr. President, you will remember I have advocated on several occasions before this club. Because Mr. Dunn comes here and talks to us who know more or less of the general subject and it gets no farther than our magazine, which only goes to the members, it does not reach the people who should be informed. The real reason for their ignorance is that the average man only sees the railroad train as it goes past at 20 or 60 miles an hour, and the railroad itself is a dead thing with two tracks and the only life about it is when a section gang is repairing it or the watchman goes along tightening up bolts and nuts on the track. The balance of the time the average man does not see anything done and therefore he thinks that the railroad is of no interest to his business. The manufacturer also likewise assumes that the railroad service is like the light and the air that are furnished to him by the Creator free, and because he can telephone for a car and it is placed on his siding and he loads it and the yardmaster sends for it when it is loaded and takes it away, he thinks nothing more of the railroad. The real thing about it is the "Logic of the Ledger," that more money must come in than is paid out or you go into bankruptcy.

That leads us to a question that I want Mr. Dunn to answer as illustrating the difference in understanding this railroad problem from the manufacturing, that is, that the manufacturer can control the question of the amount of business he does, but the railroad operator cannot control that situation because the public laws and the duties to the public require that he shall carry whatever freight is handed to him at all stations, not merely the stations he may select. And the variation of the service is something that is difficult from the accounting standpoint to calculate as bearing on this net return. The question is whether it can be ascertained from an accounting standpoint that a railroad operation can be carried on in any effective way simply as a manufacturing operation so as to produce what we may call this fair net return. A manufacturer can figure out his cost before he takes a contract. The railroad cannot do that. We have had in the last nine months more business than has ever been done before, and the railroads have been able to handle it, but they have handled it simply bcause they could not refuse it. And the question comes up as between the different parts in calculating its effect upon this net return. It has been an interesting situation to know how that can be controlled.

It is very simple also as to why this immense burden of legislation has been put upon us. As I have taken occasion a number of times to say to my railroad friends in times past that it is the same old story of those who know what should be done, doing exactly the contrary which created this public sentiment that led to the first organization and appointment of the Interstate Commerce Commission as far back as 1887. The theory of anarchy is that if everybody does what he ought to do and should do, you do not need any government at all. That is perfectly logical and perfectly true and if that were done in the railroad service and every other line of business we would not need this burden of legislation that we have. To illustrate just exactly what is meant by this propaganda, a friend of mine came into the office one day, and it was at the time when this agitation was going on concerning valuation. He was a retired corpenter-contractor and not a demagogue by any means, but he was filled up with these notions of the railroads being overcapitalized and therefore being a burden on the public. I said to him: "Did you ever figure out just what this railroad valuation is?" No, he had not thought of that. I picked up a book of railroad data and figured out for him that if the total reported capitalization of the railroads were divided by the number of miles of track, it figured out practically $8.00 per running foot. That brought it within his foot rule of daily practice. He could see exactly what that meant. That included not merely the track but the rolling stock, the stations and the entire railroad property. After turning it over in his mind a few minutes he said: "I never looked at it in that way,and if that is the valuation, that is not out of the way at all." He was converted from whatever notion he had gathered when the railroad valuation was brought within his comprehension and he could see what it meant. That is exactly what the speaker means by putting these facts before the public within the reach of their comprehension. When you talk about assets running up into the billions it paralyzes the average mind. It is just like a jury, when you call in a dozen average farmers and set them down in court to decide a case on evidence involving from $100,000 up it is a fallacy and unfair to those jurors to ask them to decide a question which is beyond their comprehension and something they had never come across before and which they would not have been asked to do as an ordinary business matter.

I approve very heartily of the theory of the speaker that it ought to be carried to the extent of being laid before laymen of all classes. I would like the gentleman also to say how many times he has delivered the substance of this lecture before bodies other than railroad bodies, that would reach the business men as he says it ought to be done.

Confusion is made as to the guaranty under the Transportation Act, in that such guaranty was given from March 1 to September 1, so that continuation of such idea among non-exact thinkers is easily seen to be possible, and substituted for the rate of return when earned to be allowed before division of surplus with the government. There is a cure for communistic notions as shown when Dr. Lucius H. Bugbee, some five or six years ago, as pastor of Christ Methodist Episcopal Church, brought to prayer meeting a Bolshevik booklet sent to him through the mail. During the discussion the doctor said that when a student at the Boston Theological Seminary, he was much taken with the idea of the Apostles having all things "in common." I asked him when he had changed his notion about the "niceness of having all things in common." He replied, "When I got married." No doubt such evidence would produce a unanimous verdict among all of you as to similar experience leading to Safety First.

MR. JOHN F. LENT: Mr. Chairman and Members—I have been very much interested in the address and very much impressed with it. I rather anticipated from a knowledge of the speaker that we were going to get a treat tonight. The question of getting information to the public on railroad matters has impressed me for a good many years—the public has a lack of that information or the full comprehension. I have heard this, that when business is good the shipping public are not so much concerned about the measure of the rate as they are about service; but when business is bad they become very economical as to the trend of the rate, and, of course, then the service is improved because there is not so much to handle.

I do believe that the complexity of the interpretations of the Act and the innumerable decisions of the Commissions and the elaborate addresses that have been made by legislators who are not in direct contact with the shipping problems, tend to confusion in the mind of the average citizen. It is a study that almost takes your constant attention to comprehend. I am heartily in sympathy with a program that will inform us more and more of the simple things put out in a plain, concise form, and I particularly applaud the effort of the American Railway Association, who have recently sent out very plain diagrams that anybody can read, as to the trend of traffic. I do think that much might be said about the comparative rates that are assessed on traffic because of the lack in this country of a scientific principle of rate making and consequently its reliance upon rates by comparison. And the shipper who is not brought into proper accord with his competition for his relief files a petition if unsuccessful in getting a correction of the matter by the railroad people. So that most of the contention on rates comes from the individual sufferer as against the competition, not so much in the measure of rate, as a comparison of the rate.

MR. FRANK J. LANAHAN: Mr. President, I think we owe a debt of gratitude to Mr. Dunn for delivering to us as he has, and bringing home so forcibly, the realization of the danger threatening the railroads which in turn will affect business generally, extending through financial institutions to us as individuals. Knowing Mr. Dunn as we do, as an authority and thoroughly responsible in his statements, the statistics he presents are of the gravest concern and should stimulate to action all of his listeners to prevent adverse legislation. Most significant are his references to the sentiment in the West. We are all aware of the late political upheaval and the success of the railroad baiting candidates in the election last November. Too recent is the concern expressed by the leaders of finance and commercial life to forget their apprehension over the radicals elected to the next Congress from the country beyond the Mississippi River. It is expected that these new Congressmen and Senators will go as far as possible in legislation, to injure the transportation lines and it is but natural to expect that after they have enjoyed the experience of debauching the railroads of the country, will turn their attention to the general lines of industry and dish out to them allopathic doses of the same treatment. It would seem to me that we are all in the same boat and it behooves those of us who manufacture railroad supplies to be alive to the danger and take steps to limit the scope of these destructionists.

You who were here thirty days ago and listened to Mr. Horn heard him tell of the propaganda that is floating about the country and the efforts that have been made to destroy capitalism, to reach out in lines of Socialism and Bolshevism, and you who read the literature of even the most conservative labor journals cannot help but observe that there is a feeling of decided antagonism and absolute opposition to every order that is now existing. There are groups holding nightly meetings as well as devoting Sunday afternoons to the delivering to their listeners spleens of hate. It has grown to be a popular fantasy and the majority of our people look upon the situation with a pronounced apathy. Is it not pertinent to ask where is this going to lead us? What presently will be the result to you, individually, if this policy is pursued. Thinking people are regarding the developments with grave concern. Men who are otherwise sane, are imbibing the idea, and this is fostered by self-seeking politicians, that an economic change is inevitable and efforts are studiously being made to arrange class against class by our representatives in the legislative halls of the country. They seem to have conceived the notion that the more radical they are in their enactment of laws, the more popular they will be with their constituents. Have we not all derived great benefits from this magnificent country in which we live? Have not opportunities for advancement come to us innumerable times and have not all of us the enviable position of looking over the years of our active lives and realizing the achievements that are ours, that in our younger days we never dreamed as possible? Why are we not grateful for what has come to us and in the realization of the benefits that have accrued to us, collectively and individually, show a little appreciation to the source from which we derived these advantages Would it not be well to follow Mr. Dunn's suggestion to do a little propaganda work, not necessarily on the floors of debating societies nor public halls, but during our daily occupations with our fellow workers, our neighbors, the members of our little clubs, and even our own home folks? Give to the man who holds you in respect the benefit of your ideas and point out to him clearly what all this turmoil means to the future of the country. None of us would like to see everything topsy-turvy, as it is in Russia, and I do not suppose any of us would care to see a Lenine or a Trotzky rule us with an iron hand. But, gentlemen, the propaganda that is going around is in that direction! Mr. Dunn made no mention of this, but about three months ago, Mr. Hooper, Chairman of the Labor Board, came out publicly and accused the labor people of advocating and urging and paying for publicity trying to belittle and undermine and destroy the transportation lines of the country. Is that right, Mr. Dunn?

MR. SAMUEL O. DUNN: Yes.

MR. FRANK J. LANAHAN: That is absolutely a straw showing you how the wind blows. What are any of us doing to counteract that? I will take the blame with the rest. I think Mr. Dunn is perfectly right when he says that the heads of our transportation lines are not coming out publicly and meeting this issue. There are a few exceptions, for instance, Mr. Markham of the Illinois Central Railroad has gone to all the public meetings along his line and made known the railroad side of this controversy. The idea that most people have that the railroads are subsidized, that they are guaranteed 5¾%, is very widespread. If they were under government ownership you would have billions of dollars to make up out of taxes to equalize the deficit. You all know how it was under Mr. McAdoo. That is just exactly what we will have to contend with.

In closing I feel that we owe to Mr. Dunn a particular debt of thanks for the intelligent and clear cut manner in which he has presented his thought. I am delighted to have heard him and I think it is fine that we shall have it all published in our Proceedings, because that is something that can be distributed around very advantageously over the country at large and the Railway Club will also derive a great deal of credit for having that in their Proceedings.

MR. SAMUEL O. DUNN: I fear from the tine of the discussion which has followed the reading of the paper that I may have caused a more pessimistic feeling in some quarters than was my intention. In the first place, as far as this year is concerned the prospects certainly are that the railroads are going to continue to do a good business, that they are going to make a good net return from it and that they are going to continue to spend a lot of money with those from whom they make purchases. Of course, the dangerous feature of the situation is what is going to be done after Congress meets. There will be unquestionably a long struggle in Congress over the railroad question, and my purpose in saying what I have here and elsewhere is to try to awaken as many people as I can to a realization of the fact that we have a fight on our hands and all who are interested in the outcome of that fight should participate in it.

I was talking the other day with an officer of one of the eastern lines in regard to this radical sentiment in western territory. Some observation was made by him to the effect that it seemed that most of the work to educate public sentiment should be done in the west. I said I did not believe that was actually true. The west is where the most dangerous sentiment regarding railroads exists. There is no question about what men of the radical class are going to try to get Congress to do. The fact of the matter, however, is that the members of Congress from the more conservative eastern and to some extent southern states, outnumber them, and if it were possible for the people of these more conservative states to get their own representatives in the House and Senate to stand fast against the attack upon the railroads which these western radicals are going to make, they unquestionably could protect the railroads from the sort of legislation that is being advocated.

Now, I am a western man. I was born in the west and brought up in the west and I know those people. I spent my life among them. Certainly it is not my thought that we should attempt to array east against west. At the same time it does seem to me that those who live in this eastern territory should do what they can to get their Representatives and Senators to cast their votes right when this attack in Congress does come.

Something was said about the "guarantee"—I think by Mr. Redding—and Mr. Lanahan referred to the amount of money the government would have to pay the railroads if they had actually been guaranteed the returns they are said to have been guaranteed. I have very recently made a calculation as to the amount by which the railroads in the three years since they were returned to private ownership have failed to earn the net returns they are said to be guaranteed. The difference between the amount they are said to be guaranteed and the amount they have actually earned and received is $1,200,000,000. In other words, if they had got the money they are said to be guaranteed their net returns would have been approximately $3,300,000,000, and they have been about $2,100,000,000, a difference of about $1,200,000,000. But there is no obligation upon the government to pay one cent of that difference. There are no guarantees, of course.

I believe it was Mr. Anderson who raised the question as to whether I had made addresses similar to this before gatherings other than railroad men. Gentlemen, I have been a regular John the Baptist crying in the wilderness. I have been making speeches and speeches, God knows how many—before every kind of organization in this country for some years on this subject. When I was invited to come here I said at first that I would not come because I felt that such work as I could do in my feeble way was needed more out in what I regard as my own country—out west. I have on several occasions recently faced crowds of farmers and discussed this railroad question, and it is not just exactly a light diversion to stand up before audiences of from 200 to 3,000 or 4,000 farmers, and tell them things about this railroad situation that you know they don't believe and that they don't want to hear any way.

But I have been doing it, and I am not asking that anybody else do my part of the job. I am only trying to stir up a lot of other people to get into this fight, because this is a very large country and there are a great many people to be educated upon this subject and it takes more than a few people to do it. That is one of the things about this situation that to my mind needs to be impressed most upon those directly concerned—that this is a tremendous struggle we are engaged in and that there are literally thousands of people who are engaged for political and other selfish purposes in poisoning public sentiment by lying about railroad matters to the public, and there must be more people who will actively participate in the fight on the other side if it is going to be won.

I am really not pessimistic about the outcome, as you may think. On the contrary we are making progress. I think there has been within recent months the greatest awakening among railroad officers in regard to this situation that I have ever known. The railroads are doing more now to educate public sentiment than they ever did before, and they are going to do more. But it is going to take a lot of work to make the public understand its true interest in the regulation of railroads.

The question was raised as to the possibility of so managing the railroads that in spite of the very great fluctuations in their business from year to year they may be able to earn the net return required. I really do not believe there is any serious difficulty in solving that problem. Of course you cannot fix a return of even 5¾% per year and so manage the railroad business as to make the railroads earn exactly that amount in every year. But what is needed is not that they shall earn a certain amount every year, but that they shall earn it on the average over a period of years. There is no reason why rates cannot be so regulated as to offset the effect of small returns in certain years by enabling them to earn 6 or 7 or 8 per cent in years when business is good. After all, it is the average over a period of years that counts and not the amount earned in any one year.

I was very much interested in the illustration used by Mr. Anderson in reducing the average valuation of railroads to a lineal foot. It seems to me that is a very interesting way to put it. I am going to bear that in mind and make some use of it myself. As he was talking I made some figures here such as I have used before farmer audiences. If John Smith had a farm with $19,400 in it and in one year he earned upon that a net of $1,115 over his expenses and then had to pay out $650 of it in interest he would have left about $450. Nobody would think that a man who owned a $19,400 farm and earned only $1,115 net and had to pay out $650 in interest was doing very well. That is exactly the railroad business in this country. The figures are the total valuation of the railways the net return they are entitled to earn on a 5¾% basis, and the interest they must pay with six ciphers stricken off. It is a simple way of expressing a very complicated matter. I think the greatest difficulty in making this railroad business clear to the people is that there are so many ciphers in the figures.

The matter of making the railroad problem clear to the public, of stating the facts about it in an understandable way, is an extremely difficult thing. But it is not any more difficult than it was 27 years ago to make clear to the public the enormously difficult money question, and yet the public was educated on the money question very thoroughly in a matter of two or three years and the outcome of that great political contest was a result which very greatly promoted prosperity in this country. To my mind what we need is a campaign of education in this country on the railroad question similar to what we had in 1896 in regard to the matter of sound money, the kind of campaign we had subsequently with regard to the currency situation which resulted in the adoption of the Federal Reserve Board legislation. Sooner or later we have got to solve this problem. There ought to be enough brains in the railroads and affiliated businesses to devise means of stating this matter in an understandable way and getting it over to the people to whom it has got to be gotten over to. I think it can be done.

But, as I have already said, it is going to require a lot of people and a lot of work to do it. I don't think that any industry that ever was the subject of attack had a better case than the railroads of this country have today. They were returned to private ownership about three years ago. At that time operating expenses were, of course, very high. I do not remember the exact figures but my recollection is that since the peak of operating expenses was reached in 1920 down to the present time the reduction in operating expenses has been approximately $75,000,000 a month. At the present time the operating expenses of the railroads for handling the largest business they ever did are actually lower than they were in the closing months of government control, though they are paying a higher average wage for labor and a higher average price for fuel. Operating expenses in February and March, though they were handling a larger business, were $43,000,000 less than in the last two months of government control. The fact is vast economies have been found. They handled the business in January and February with over 200,000 less employes than were employed in the last two months of government control and the saving in wages due to that reduction was over $55,000,000, and it did not do labor any harm, because the average man who was employed got more wages than he did in the closing months of government control. It simply released that many men to other industries when other industries needed the labor.

Now the reduction in rates which has been made since

Jan. 1, 1922, on the basis of the freight business now being actually handled amounts to over $730,000,000 a year. Gentlemen, the railroads have a very good case indeed. The trouble is it has not been well enough presented, it has not been adequately presented, and when it is well enough and adequately enough presented we shall win this fight. And I want to say to you men as far as I am concerned I believe we are going to win it because I do believe the railroads in this country and the businesses affiliated with them in interest are going to make a fight that will win.

MR. FRANK J. LANAHAN: Mr. Dunn used a very apt illustration, cutting off the ciphers. As indicating the paucity of results, it reminds me of the old time story of the Hebrew who bought a horse and took it to the livery stable to arrange for keeping it. Mr. Cohen asked the livery man what he would charge him to keep the horse and the livery man asked him $5.00 a week for board. That was too much. "Well," he said, "how about $4.50?" Mr. Cohen said, "I can't give you $4.50." Well, they dickered back and forth for a while and finally agreed on $3.00. The next day, Mr. Cohen came back and said, "We fixed up about the horse, but there is one thing you did not say anything about. That is the manure. There will be some manure from the horse and I want credit for that on the bill.' "Hell," replied the livery man, "there won't be any manure at $3.00 a week."

If they get these rates down much farther, there will be no "manure" to the railroads. The manure is the dividends. When you do not have any dividends you do not have any investment.

Along with Mr. Dunn's optimism as to the outcome, it was my pleasure to be a delegate to the meeting of the Chamber of Commerce of the United States and the entire session, it seemed, was practically given up to the railroad question. They have the best men in the United States appointed on committees going into this subject. One of those men is Mr. Dunn. It may interest you to know that another on that Committee is a Pittsburgher, Mr. Clause, President of the Pittsburgh Plate Glass Company. The subject has been opened up in all its phases, including water and rail transportation, legislation and relations to the public. The

United States Chamber of Commerce is a very powerful body, being purely representative of the business interests of the entire country. Mr. Dunn mentioned the Railway Business Men's Associations. They are going into this subject, too. But that does not relieve us of our responsibility. I do believe that if everyone takes home with him a firm resolve to do his little part within his own little sphere to pass along this propaganda, on the lines Mr. Dunn has brought out by cutting off the ciphers, we are going to get somewhere. I know everyone here has been surprised at Mr. Dunn's figures.

I am sure that all here tonight who did not enjoy the personal acquaintance of the speaker and have been reading his articles, have thought him a much older man, because naturally we associate wisdom with age. No doubt you even looked for him to be stooped with the responsibility that he carries, but on the contrary, you observe he is typical of the times. He is young and buoyant and in a vigorous manner carries on the battle for what he thinks is right.

It has been our pleasure tonight to listen to a man who has the reputation throughout the United States of being better posted on transportation matters and having at his command more statistics on railroad questions than any other individual in the country. It is necessary for him to catch a train within the next fifteen minutes, and therefore, in bringing the meeting to a close, I move you, Mr. President, that a rising vote of thanks be extended to our fellow-member for the splendid, instructive and inspiring address to which we have listened tonight.

(The motion prevailed unanimously by all members rising.)

PRESIDENT: This is the last meeting of the Club until next September. Is there any further business to come before the Club at this time? If not, we will adjourn to the luncheon tables as usual.

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

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SCOTT R. HAYS
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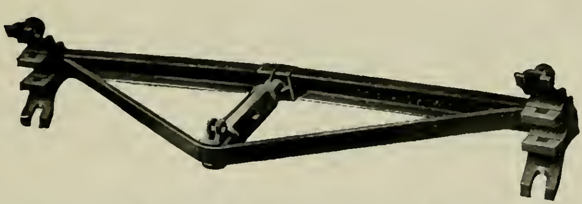

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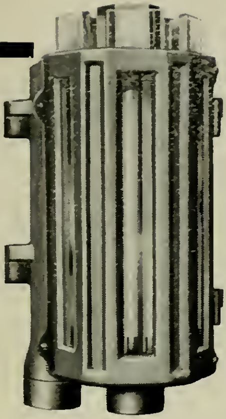

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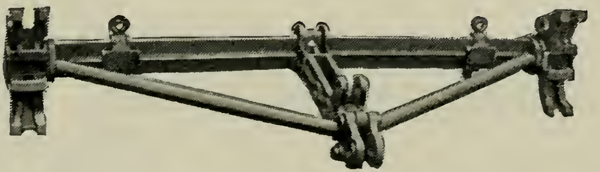

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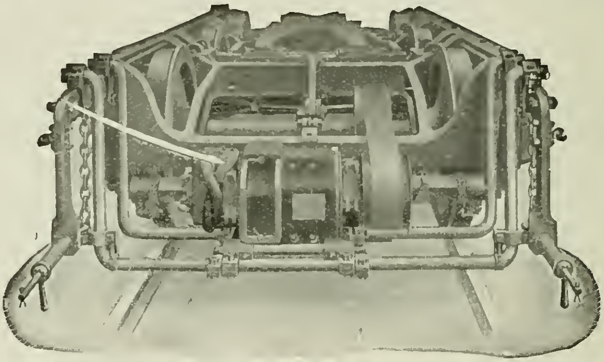

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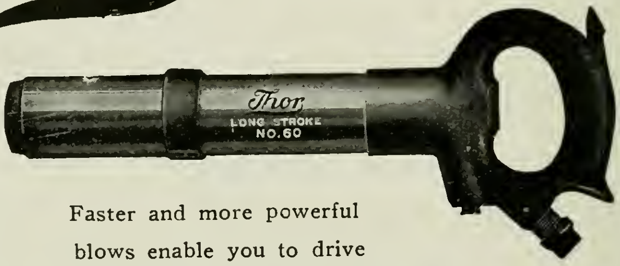

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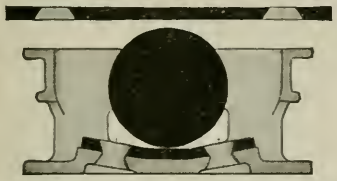

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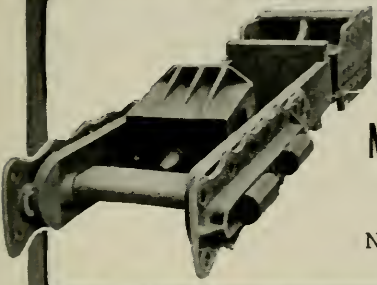

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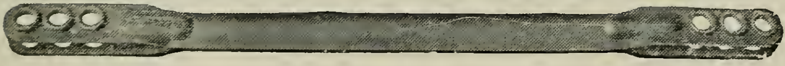

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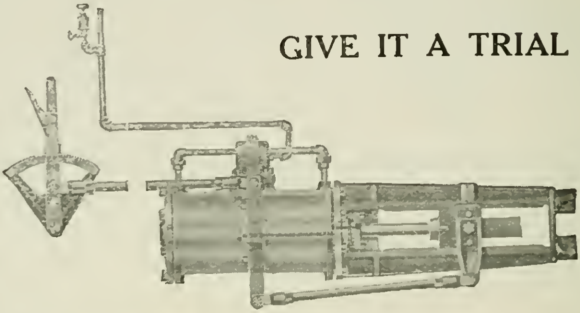

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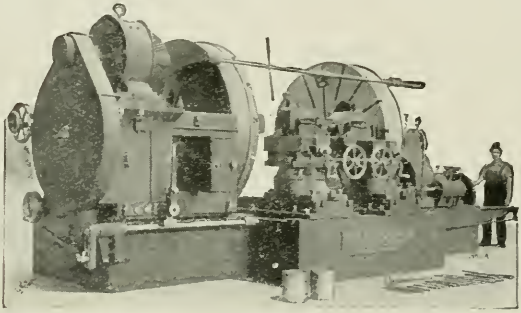

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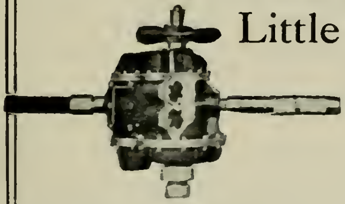

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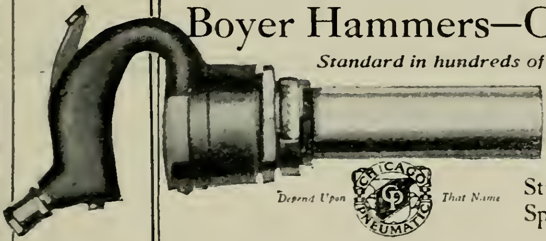

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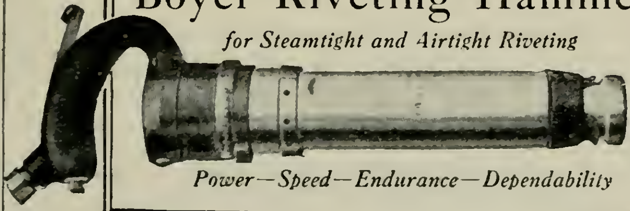

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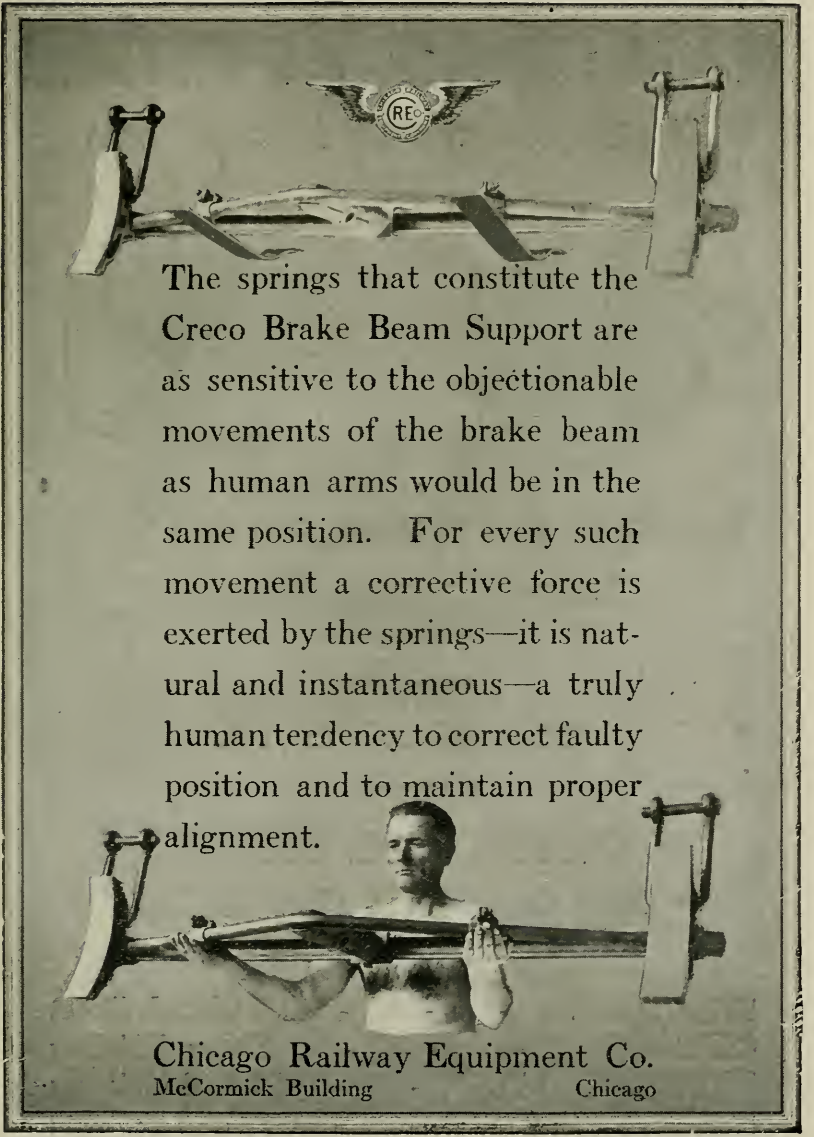

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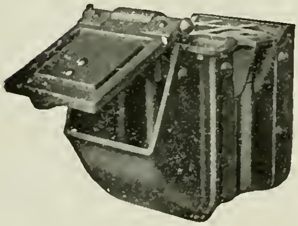

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OF
The Railway Club of Pittsburgh

Organized October 18, 1901.

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F. H. STARK	November, 1905, to October, 1907
*H. W. WATTS	November, 1907, to April, 1908
D. J. REDDING	November, 1908, to October, 1910
F. R. McFEATTERS	November, 1910, to October, 1912
A. G. MITCHELL	November, 1912, to October, 1914
F. M. McNULTY	November, 1914, to October, 1916
J. G. CODE	November, 1916, to October, 1917
D. M. HOWE	November, 1917, to October, 1918
J. A. SPIELMAN	November, 1918, to October, 1919
H. H. MAXFIELD	November, 1919, to October, 1920
FRANK J. LANAHAN	November, 1920, to October, 1921
SAMUEL LYNN	November, 1921, to October, 1922

*—Deceased.

Meetings held fourth Thursday of each month except June, July and August

PROCEEDINGS OF MEETING
SEPTEMBER 27, 1923

The meeting was called to order in the English Room, Fort Pitt Hotel, Pittsburgh, Pa., at 8 o'clock P. M., President D. F. Crawford in the chair.

The following gentlemen registered:

MEMBERS

Abel, A. W.
Adams, L.
Adams, W. A.
Anderson, A. E.
Anderson, J. W.
Ashcraft, E. J.
Berg, K.
Blakley, T. M.
Bonhoff, E. L.
Braun, O. F.
Brower, J. E.
Burke, G. C.
Burel, W. C.
Campbell, J. T.
Carbis, N. J.
Carpenter, H. D.
Christy, F. X.
Clark, Chas. H.
Conlon, John F.
Conway, J. D.
Crawford, D. F.
Croke, Thomas F.
Cunningham, H. R.
Cunningham, Howard L.
Cunningham, R. I.
Davis, Chas. H.
Davison, Charles R.
Donovan, J. J.
Doyle, Wm. E.
Edwards, C. H.
Fike, James W.
Fitzgerald, T.
Freshwater, F. H.
Fults, J. H.
Fults, J. J.
Geisler, Jos. J.
Germain, L., Jr.
Gilg, Henry F.
Goda, P. H.
Gray, G. W.
Greene, W. F.
Grieve, Robert E.
Guignon, W. E.
Gwinn, L. J.
Hansen, Wm. C.
Harger, M. L.
Haynes, J. E.
Herron, B. J.
Hoffman, C. T.
Holmes, E. H.
Howe, D. M.
Huber, H. G.
Huchel, Wm. J.
Hultman, Carl
Hush, Geo., Jr.
Jenkins, R. H.
Johnston, W. A.
Jungluth, Adolph
Kearney, J. W.
Kelly, Leo J.
King, J. W., Jr.
Kranse, Harry A.
Kummer, Jos. H.
Lanahan, Frank J.
Lilley, C. S.
Lobez, P.
Lohr, Allen W.
Ludwig, C. F.
Lynn, Samuel
Malcolm, Elmer E.
Matchett, H. K.
Millar, C. W.
Miller, J.
Merscher, John

Milliken, I. H.
Mitchell, F. K.
Morris, J. H.
Moyer, Oscar G. A.
McGregor, D. C.
Neff, John P.
Newman, J. F.
Noble, Jesse A.
Orchard, Chas.
Painter, Joseph
Parke, F. H.
Parker, W. D.
Patterson, J. E.
Peacock, W. W.
Perkins, Chas. F.
Ralph, W. E.
Raushcart, E. A.
Read, S. C.
Redding, D. J.
Redding, R. D.
Redman, J. Thomas
Reeve, G. W.
Renshaw, W. B.
Rhodes, W. H.
Rick, R. C.
Robbins, F. S.
Robinson, R. L.
Ryan, D. W.
Salisbury, Wm.
Smith, R. H.
Snyder, J. W.
Sowash, F. E.
Stahlman, M. C.
Stamets, Wm. K.
Stark, F. H.
Stevens, L. V.
Stilwell, K. E.
Thomas, C.
Thomas, E. K.
Trueblood, H. J.
Tucker, J. L.
VanVranken, S. E.
Walter, W. A.
White, A. B.
Winell, K. O.
Wright, J. B.
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Metcalf, M. F.
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Schrontz, S. B.
Shellenbarger, H. M.
Shelley, G. F.
Smith, Chas. P.
Smith, H. E.
Smith, Sion B.
Speed, C. M.
Spurr, A. C.
Sundholm, F. J.
Weetzel, C. E.
Wright, J. L.

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Bandish, Joseph M., Universal Packing Corp'n., South Bank, Overbrook Borough, Pa. Recommended by Alfred S. Osbourne.

Cooper, J. P., Commercial Dept., Westinghouse Air Brake Co., care of Tonnaleuka Club, Wilmerding, Pa. Recommended by Allen W. Lohr.

Dunbar, Harold F., Sales Rep., The McConway & Torley Co., Forty-eighth Street & A. V. R. R., Pittsburgh, Pa. Recommended by Stephen C. Mason.

Eagan, D. F., Asst. T. M. & Div. Opr., Penna. System, 39 Mt. Oliver Street, Pittsburgh, Pa. Recommended by T. M. Blakley.

Garner, Curtis S., Div. Mgr., American Bridge Co., 1418 Frick Bldg., Pittsburgh, Pa. Recommended by D. M. Howe.

Howe, David M., Jr., Routing Clerk, Jones & Laughlin Steel Corp'n., 224 Balph Ave., Bellevue, Pa. Recommended by D. M. Howe.

Kempton, J. W., Gen. Secy., Y. M. C. A., P. & L. E. Railroad, Newell, Pa. Recommended by J. J. Donovan.

Lappe, J. C., President, Federal Sales Co., 219 Third Ave., Pittsburgh, Pa. Recommended by D. J. Redding.

Loughner, E. G., Pittsburgh Dist. Sales Mgr., Carbo-Oxygen Co., 708 Swissvale Ave., Wilkinsburg, Pa. Recommended by Samuel Lynn.

Lynch, E. K., Special R. R. Rep., Chicago Pneumatic Tool Co., 6 East 44th St., New York City. Recommended by W. J. Murphy.

Malcolm, Elmer, E., Engineman, Penna. System, Freeport, Pa. Recommended by T. M. Blakley.

Rhodes, William H., Cash Clerk, Treas. Dept., Penna. System, 325 Dalzell Ave., Ben Avon, Pa. Recommended by J. D. Conway.

Rowe, J. L., Asst. Mgr. R. R. Sales, Chicago Pneumatic Tool Co., 6 East 44th St., New York City. Recommended by W. J. Murphy.

Shellenbarger, Herbert M., Commercial Engr., Westinghouse Air Brake Co., 117 Tenth St., Turtle Creek, Pa. Recommended by Allen W. Lohr.

Smith, Robert M., Sales Mgr. R. R. & Car Dept., James B. Sipe & Co., Bridgeville, Pa. Recommended by H. L. Clemmer.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

At this meeting it is necessary to appoint a Nominating Committee to place in nomination a list of officers for the year 1923-1924. I therefore appoint as such Committee, Messrs. D. M. Howe, D. J. Redding and Frank J. Lanahan. The Committee will please be prepared to make their report after the reading of the paper of the evening.

Announcement was made of the death of Mr. H. H. Hunter, Dispatcher, P. C. & Y. Railway Company, died September, 1922.

PRESIDENT: Appropriate memorial will appear in the Official Proceedings of the Club.

Is there any further business to come before the meeting? If not, it gives me pleasure to introduce to you the speaker of the evening who will address us upon the subject of "Motor Transportation," a branch of the art in which we are all showing, and must have, increased interest. I am happy to introduce Dr. L. W. McIntyre of the Department of Civil Engineering, University of Pittsburgh, who will now address us.

MOTOR TRANSPORTATION

By L. W. McIntyre

Gentlemen:—The story is told that a certain ambitious young man went to the president of a certain university and said:

"Sir, I desire a course of training which will fit me to become the superintendent of a great railroad system. How much will such a course cost, and how long will it take?"

"Young man," replied the president, "such a course would cost you twenty thousand dollars and might require twenty years of your time. But, on the other hand, by spending perhaps three hundred dollars of your money and three months of your time you might be elected to Congress. Once there, young man, you will feel yourself quite competent to direct not only one, but all the great railroad systems of our country."

I shall not try in this paper to show you how to run the railroads, but shall only indicate to you in small measure the necessity for study of motor transportation as a possible means of further improving even our present unexcelled transportation facilities.

After all, the purpose of transportation is to get persons and commodities from place to place in the cheapest and most expeditious manner. And it is particularly the case with freight, that the agency used is not a matter of concern, as long as the commercial needs of producer and consumer are met. IMPROVEMENT NEEDED. All of us will admit that however good we may think our present transportation facilities in comparison with those of the remander of the world, they have been and are at present insufficient to handle our rapidly growing volume of production. A New England manufacturer is authority for the statement that it costs $2.42 per week more per man to hire men in New England than in Chicago because it costs that much to transfer food from Chicago to New England where it is consumed. He prophesied that unless agriculture in the New England section was further developed or transportation cheapened, he would have to move his plant to Chicago.

And all of us recognize that the whole history of economic progress has been a struggle of the new against the old. The steam lines, the electric lines, and finally the motor vehicle have had their over enthusiastic adherents and propagandists and their ultra-conservative antagonists. The first disposition has always been to regard the new comer as an enemy. Examine the following quotation from the "History of Transportation of the United States Before 1860." This will show how reluctant people were to favor railroads instead of highways.

"Many other groups were hostile. Farmers feared to lose their market for horses, hay, and grain, and they foresaw also a rise in insurance rates to cover the increased danger of fire. Tavern keepers who derived their custom from stage and horseback travel set every possible obstacle in the way of railroad construction. They were especially successful in Pennsylvania on the route of the Conestoga wagon track. The wagon drivers themselves joined the stage lines in opposing the new means of transportation wherever possible. Many good people, too, feared moral decay and the effect on the reason of quiet folk whose habitual calm would be broken. The peaceful village of Newington, Connecticut, sent a remonstrance to the directors of the proposed road, begging that their orderly quiet should not be disturbed by the steam cars and consequent strangers."

I desire to submit that a transportation "system" and not merely he provision of transportation units, is essential for every municipality, state or nation. Every means of transportation should be used to make up this system if, and only if, it can be shown to be best suited for the particular function which it performs. It is from this point of view that the writer approaches his subject. He is distinctly not a motor transport propagandist.

Questions At Issue

The chief questions at issue in the consideration of motor transportation, appear to be those of the place of the truck in interurban movements, the possibility of abandonment by the railroads of the so-called "unprofitable short hauls," of more modern terminal practices, of the field of bus and electric line in the city, the legal phases governing each, and the effect of motor operation on street and highway programs.

Basis of Comparison

One of the difficulties that is immediately encountered in endeavoring to allocate the truck in interurban movements is that most of the comparisons available are based on the rates charged and not on costs. A considerable portion of our present day trucking is being handled by tramp operators who have little knowledge of the cost of this service. They engage in cut—throat competition and the short lives of the majority of them is an indication that in many cases their rates are below cost. It is reported that of all the highway transport companies doing business with New York as a center, 90 per cent fail within three years after entering business. Neither can it be said that the rail rates always are an indication of the cost of the service rendered.

Interurban Movements

It is coming to be pretty generally agreed that interurban movements may be divided into three classes, the first involving distances of from 15 to 25 miles and constituting a terminal zone in which the motor vehicle should dominate, the second involving distances of from 50 to 150 miles in which the railroad has the advantage, and the third involving the distances between 15 and 25 miles on the one side and 50 to 100 miles on the other side in which both units are competitive.

Comparison of Rail and Truck Rates

The following table is taken from the report of the Joint Commission of Agriculture Inquiry, part III, page 362. It shows a comparison of rail and truck rates from New York City to various cities in New England using the rail rate of the New York, New Haven and Hartford Railroad, effective November 15, 1921, and the average rate of six trucking organizations operating in this territory. The rates compared are door to door delivery rates in each case, a charge of 30 cents per 100 pounds being added to the terminal to terminal rate. When the commodity is shipped by truck without packing and crating, while packing and crating is required for shipment of the same commodity by rail, packing and crating charges are included in the rail rate, the allowance being 24 cents per 100 pounds for boxing plus 17 per cent of the rail rate for additional weight of box or crate. The amount of these allowances is open to question. A change in them would affect the figures taken as boundaries for the three zones mentioned but not the existance of these three zones. This table bears out the conclusions above stated, for it shows that in general commodities taking multiple class rates can be carried at lower rates by truck up to about 140 miles, first class commodities up to 70 miles, second class commodities up to 45 miles and third and fourth class commodities up to about 25 miles.

Heavy line indicates the limit of economical truck shipment on the basis of rate comparison for each class of freight.

On the basis of these figures and taking into consideration the relative amounts of each class of freight being handled, the average length of haul at which the truck rate and rail rate become equal is from 45 to 50 miles.

TABLE I

Summary comparison of rail and truck rates
(Excess of truck rate over rail rate indicated by ×)

City	Mileage	Multiples of First Class	First Class	Second Class	Third Class	Fourth Class
Greenwich, Conn.	30	—56	—15	— 6½	× 1½	× 9½
Coscub, Conn.	32	—62	—16		0	
Stamford, Conn.	35	—47	—16	— 8½	0	× 8
Norwalk, Conn.	44	—44	—10	— 2½	× 7	×15½
Westport, Conn.	47	—47	— 9½	— 1½	× 8½	
Bridgeport, Conn.	58	—49	— 4	× 4½	×14½	×24
Danburg, Conn.	66	—29½	0	× 9	×19½	
Derby, Conn.	72	—41	— 4½		×15	×25
New Haven, Conn.	75	—33	× 7½	×16½	×27	×35
Waterbury, Conn.	90	—21	×10½	×20½	×31	×41½
New Britain, Conn.	106		×12	×22½	×30½	×41½
Hartford, Conn.	112	—11½	×20	×30½	×38	
Springfield, Conn.	139	— 4	×38	×48½	×56	
Providence, R. I.	203	×28	×76		×94½	
Boston, Mass.	243	×58	×105			

Types of Commodity Hauled by Trucks

On the other hand this data bears out the claim of the railroads that motor vehicles are making considerable inroads into the hauling of high class commodities, leaving to the railroad largely the lower class of freight of large tonnage and low receipts. This is further brought out in the survey conducted in Connecticut by the Bureau of Public Roads from September 11, to December 3, 1922. The tonnage value of the material is nearly proportional to the distance hauled. On trucks of ¾-ton capacity products of mines were hauled an average of 21 miles; products of agriculture an average of 48 miles; products of animals an average of 54 miles; products of manufacturers and miscellaneous an average of 75 miles. The percentages of each class of commodity carried by motor truck were:

TABLE II

Products of mines	6.65
Products of forests	4.14
Products of animals	7.14
Products of agriculture	8.44
Products of manufacture	73.63
	100.00

Of all the tonnage carried 81 per cent originated in the state and only 19 per cent in outlying states.

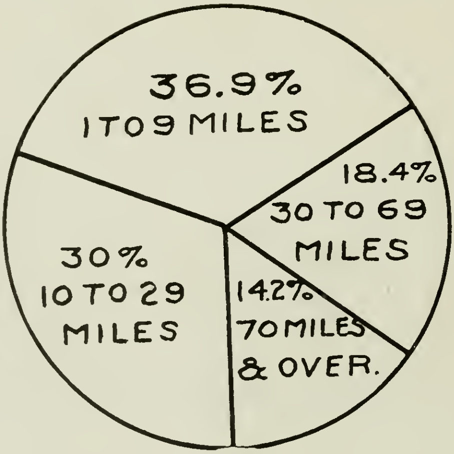
Comparison of Tonnage and Distance Hauled

An analysis of the tonnage coming from New York City and destined for Connecticut points was made at the Greenwich station at the New York state line on the Boston Post Road. The results are as follows:

TABLE III

Destination	Tons	Percentage	Distance Miles
Greenwich	2,216	7	30
Stamford	7,247	22	35
Danbury	1,011	3	63
Norwalk	3,684	11	44
Bridgeport	7,086	21	58
New Haven	4,853	14	75
Waterbury	1,435	4	90
Hartford	1,186	3½	113
Vicinity of New Haven	2,258	7	74

These figures are necessarily affected by the population and character of the industries of the communities tabulated but they do show distinctly the lessening tonnage hauled by trucks as the distance increases. A summary of the results of the entire survey is shown in the following diagram:



Summary

These figures show that in Connecticut at least competition between the motor truck and the railroad is confined to goods which if moved by rail would have been L. C. L. freight express or parcel post, 66.9 per cent of the commodities moved less than 29 miles, a large portion being local distribution from jobbers and wholesalers to retailers. Of the balance of 32.6 per cent transported more than 30 miles, a considerable portion was goods the transportation of which was not largely determined by the rates charged. Some of it was between points not adequately served by rail and some of it was by its nature more adaptable to truck transportation, such as furniture and household goods, fresh vegetables and meats, wholesale grocery products, etc. This would seem to indicate that the percentage of commodities hauled by the motor truck which could have been profitably hauled by the railroad or in the haulage of which the railroads could have furnished an equal service was small. The actual percentages of commodities hauled by the motor truck would normally be even smaller than those listed for there was a strike on the railroad at the time the data was collected.

As for the evidence of the appreciation by the motor vehicle industry of the lack of economy in the long haul by motor vehicle, there were driven away from Detroit in May of 1923 approximately 66,000 motor vehicles. A prominent automobile manufacturer told the writer that probably not more than 7,000 of these would have been driven away had rail facilities been adequate.

Mr. Elisha Lee, Vice President, Pennsylvania Railroad system, in a speech before the Society of Automotive Engineers, on January 11, 1923, I think summed up very well the place of the truck in interurban movements when he said "Such profits as the railroads are able to make at all come practically altogether from the mass transportation of freight and passengers, over at least considerable distances—in other words from what we may term the 'wholesale department of transportation.' This is just the form of service in which experience shows that trucks cannot consistently earn real profits. On the other hand, those forms in which trucks can and do make money are almost invariably the strictly 'retail' forms in the rendering of which railroad operation practically always involves losses, and sometimes very heavy ones."

The Short Haul

This brings us to the second question at issue. Shall the railroads abandon the 'short haul?' The answer to this question depends upon fact. Is the short haul really unprofitable? If we apportion to the short haul traffic its share of the station expense, overhead costs, etc., it can undoubtedly be shown to be unprofitable and therefore should be abandoned in favor of some other unit, probably the motor truck provided this other unit can be sufficiently regulated so that it furnishes a reliable year around service. But this is not the true cost of the short haul traffic. For many roads this short haul business is verily their lifes blood. What we need to know in order to answer this question is the "out of pocket" cost of such traffic. The public would allow very few of our railroad stations to be closed even if the short haul traffic were abandoned. The station expense would therefore not be materially reduced if no short haul business were taken. And there are a large number of other expenses a proportion of which is now charged to the short haul tonnage which would not be materially reduced through its abandonment. If the additional revenue received from this business is at all greater than the actual additional cost of rendering the service as is the case I am sure with a large number of railroads, then the business should by all means be retained, both in the interests of the public and the stockholders of the properties concerned. A knowledge of the facts in the case would I think, enable rates to be made in many cases which would tell a different story concerning truck competition.

Unfortunately, the railroads, although able to tell to the third decimal part of a cent the cost of spikes, are unable to furnish this, which seems to me, to be vital information. Until these facts are brought out I do not think this question can be satisfactorily answered.

Terminal Practice

A traveler who had visited most parts of the world, was once heard to remark that during his travels he had noticed that wherever there was a great center of population or industry, a wise Providence had seemingly provided a navigable river or an arm of the sea and advantageous locations for railways to connect it with other parts of the country. While his powers of observation were evidently greater than his powers of thought, he emphasized the undoubted fact that the modern terminal is a very vital factor in the growth and prosperity of our cities.

Present Terminal Practice

In Pittsburgh, of all places, and to the Railroad Club of Pittsburgh of all groups the need for improved terminal practice need not be demonstrated. Our present terminal practice is a relic of the days of horse-drawn street traffic. At that time, because of the limitations of the horse, it was necessary to place stations comparitvely close together and close to the industrial districts. Frequent movements of freight cars over short spurs of track were necessary. The presence of the terminal facilities themselves has caused the adjacent portions of the city to grow very rapidly, and the value of the real estate to increase tremendously. This has brought with it the attendent burden of very high fixed charges and operating expenses. Continued growth of the city has made the terminal facilities inadequate, yet to increase them in their present locations will cost almost ruinous sums.

We have an example right here in Pittsburgh in the proposed freight terminal development by the Pennsylvania Railroad Company in the vicinity of Forbes Street and Sixth Avenue as advocated by the Citizens' Committee on City Plan. As if the congestion in our downtown streets was not suffient without adding the greater confusion which is bound to ensue in the vicinity of a freight station. No decrease in rates would result from such an expansion, and at best the relief would be but temporary . Increased growth of the city would inevitably make further expansion of the terminal facilities necessary. And then what! The interests of the public demand that such a development be positively prohibited.

Terminal Costs

Consider the following terminal costs in the Pittsburgh district.

In 1920, it cost the B. & O. Railroad $3.65 per ton for switching, handling, billing and interest charges in the Pittsburgh terminal. At the Duquesne Freight Station the cost was $3.85, not including the makeup in the Allegheny Valley yards. These are L. C. L. figures. At the Wabash Station it costs as much to elevate the L. C. L. freight as is made on 68 miles of haulage. At Federal Street it costs as much to elevate the L. C. L. freight as is made on 85 miles of haulage. Why continue to support a scheme of operation which but perpetuates and makes worse such conditions?

Mr. W. H. Lyford, Vice President of the Chicago and Eastern Railroad Company, is authority for the following figures regarding terminal costs in Chicago. "In Chicago, the interest charge alone on real estate at Twelfth Street, on which a freight station is located, is more than $2.30 per ton of freight handled through the station. If the station were located at Thirty-third Street, such interest charges would be reduced to about 80 cents per ton. The amount of interest saved by moving the station to Thirty-third Street would pay the cost of well organized cartage between the Thirty-third Street station and the premises of the trader. The present cartage charges would be saved." Here we have a distance of less than two miles in the location of a station producing a difference of 300 per cent in the interest on real estate occupied by the stations. I do not advocate the abandonment of existing terminals. This would work a hardship upon industries which established themselves in their present location largely on the theory that the transportation facilities then offered would be permanent. But, by all means, do not extend such facilities further in our congested districts.

Modern Terminal Plans

You are all familiar with the so-called "Cincinnati Plan," where incoming freight is carried by industrial trucks to demountable motor truck bodies on the main station platform. When loaded these bodies are sealed and under telephone order of a joint dispatcher, employed by the railroads, mechanically loaded on to trucks and thus routed over the city's streets to connection. On arrival at the outbound platform of the connecting line the body is mechanically removed and an empty body, previously unloaded, is similarily put onto a motor truck chassis for delivery to the inbound platform of that freight house, where the operation is repeated and another loaded body forwarded in the same manner to some other freight house.

Or the operation of the Columbia Terminals Company of St. Louis, which transfers practically all the L. C. L. freight that is interchanged between St. Louis, from what is known as the Western trunk line terminal, and the terminal of the Eastern railroad trunk line in East St. Louis, Ill., across the river. The transportation of L. C. L. freight between these depots is better accomplished by tractor and trailor equipment than in any other way.

And the plan of the Erie Railroad in New York which, according to the port of New York authority, has cut the terminal charge from $3 to $1.40 a ton through the use of motor trucks in the transportation of L. C. L. freight from Jersey City to inland stations in New York.

And then there is the Unit Container Car which is emerging from the experimental stage on the New York Central Railroad.

Suggested Terminal Plan

We have an opportunity here in Pittsburgh to help solve the terminal problem and reduce freight rates through the use of the motor truck and possibly the street car. By making any extensions in the way of freight terminals in outlying districts the added capital charges can be reduced to a minimum. By using unit containers, or demountable bodies, L. C. L. freight could be hauled to its destination either to scattered downtown stations, to outlying suburbs, or to the actual door of the consignee by motor truck, or by electric street car, or both, as careful study might show to be advisable.

And such a scheme is expansible as the city grows. In time every building designed to be rented to commercial concerns will have its freight receiving room with facilities for handling unit containers and with persons in charge authorized to sign for incoming freight. There is no reason to believe this will not become as common as elevator service is today.

I am informed on what I believe to be fairly good authority that a tender has already been made by one of our railroads to a local trucking concern for the delivery of all the L. C. L. business from one of its freight terminals to points within a radius of 40 miles. Does this not indicate the trend of the times?

Regulation

All transportation interests must have done with the narrow and jealous policies of the past. Failure to co-operate will shortly be intolerable to the public. The railroads have been regulated in and out of season and the next Congress, judging from the past records of its personel is quite likely to produce additional objectionable legislation. But the demagogue is aided by the cry of the railroads that motor transport is subsidized by the building of highways. We have just escaped from government operation of the railroads, for which most of us are thankful. But what about a proposal for government ownership of the road bed and regulated private operation with a rental for the road bed used? Would it be any better? The following quotation from one of the daily papers shows what one state is doing to furnish transportation service which the railroads have apparently failed to provide:

"Private enterprise having failed to furnish adequate transportation facilities for Nerthwestern Colorado and Northeastern Utah, the people of Colorado will now furnish the necessary facilities by driving a great tunnel through the Continental Divide, west of Denver.

It is estimated the work will cost $7,000,000. Management of the enterprise is entrusted to a commission named by the governor. The state will be reimbursed by a tax on the land owners in the territory affected. The legal side of the undertaking was approved last week by the United States Supreme Court.

Lying between Denver and Salt Lake, but west of the Continental Divide, is a vast strip of comparatively undeveloped country. In area it is the equal of one of the big Eastern states. Experts say it contains coal deposits equal to those of Pennsylvania. Gold and silver and lead and oil and asphaltum have been found there. Its agricultural and stock raising possibilities are great.

Twenty years ago David H. Moffat, the most powerful banker in the West, conceived the plan of driving the Moffat road through this territory from Denver to Salt Lake. He sunk millions in the enterprise, but died broken-hearted and almost a bankrupt. Wall Street had sandbagged him because his road would compete with the Goulds' transcontinental line on the south and Hariman's Union Pacific on the north.

Moffat succeeded in getting his road over the mountains, however, and into the coal fields of Northwestern Colorado. The road was not a paying proposition because it could not operate in the winter. The heavy snows on the divide were unmanageable.

After Moffat's death the road drifted into the hands of a receiver, and efforts were made to sell it. No one wanted it because it could not be made a success unless a tunnel could be dug through the main range, thus avoiding the heavy snows of winter.

Pay Rental to the State

When private enterprise had been given full opportunity to develop this wonderful enterprise the people of Northern Colorado finally induced the state legislature to make the construction of the tunnel a state project.

When the tunnel is completed it will be used not only by the Moffat road, but by any other road which desires a Western outlet. The only restriction is that the roads using the tunnel must pay rental to the state.

The tunnel will shorten the distance between Denver and Salt Lake by about 200 miles. This city has been on a sidetrack so far as transcontinental traffic is concerned, but the tunnel will place it on a main line and will also permit it to benefit from the development of the territory tapped by the road."

If as numerous railroad spokesmen would have us believe, motor transportation receives its road bed free, if the water bourne traffic is saved from road bed charges, is it an illogical development for the government to own the roalroad road bed?

The Highway Transport Subsidy

Too many of the statements which are made regarding this subsidation of motor transport are not based on fact. Can any one produce figures to show how much this highway subsidy amounts to? Without going into this matter too deeply the writer would like to give a few figures to show how much this subsidy really amounts to in one particular case which he has personally investigated. This was a case of a bus operation in one of our larger cites. On this particular operation a vehicular count showed the buses to constitute one-twelfth of the street traffic. The street was a four-lane street. Assuming the traffic to distribute itself evenly over the street, we might say that six vehicles used two traffic lanes and five vehicles and one bus, the other two lanes. If we again assume that one bus did as much damage to the street as the five other vehicles using the same traffic lanes (a rather extravagant assumption), "we might justly assume that the bus should pay but half the cost of the portion of the highway used. Let us see what it was required to pay under existing law. Based on a width of 18 feet for the two traffic lanes used, the operation was paying in taxes that went directly toward the maintenance and construction of the highway 40.3 cents per square yard per year. The street was paved with sheet asphalt which cost an average of 2.60 per square yard to lay in that community. Remembering that the bus was only entitled to pay for half the cost of the pavement used, according to the previous assumptions, it was actually paying in taxes sufficient to completely repave the portion of the street used by it, including the six inch concrete foundation, every 3.2 years. Not much subsidy there! As a matter of fact the bus operation was paying at least four times the cost of all damage to the pavement that could possibly be ascribed to it, including the original cost of the pavement. The writer does not wish to insinuate that this is quite generally the case or that any general conclusion should be drawn from the figures stated other than that before the cry of subsidy is raised, it be ascertained that such a subsidy really exists. And since the railroads are going to be eventually called upon to pay a large part of the taxes imposed upon highway transport, either directly because of actual operation or indirectly because of contract agency or other indirect operation it is short sighted policy on their part to advocate increased taxation upon this method of operation. Less attention should be paid to the relatively small amount of competition and more to the possibility of co-operation, from which the railroads and the public are likely to receive great benefit.

As far as regulation is concerned, the history of the railroads has demonstrated that regulation is necessary to insure adequate and reasonable service from public utilities. Motor transport is no exception to this rule. If existing utilities are to give way to it in certain instances it must completely take their place in that it must give more than fair weather service. It must also be financially responsible. In order to insure this the Public Service Commissions must have power to inflict summary punishment for violations of its rules and not be compelled to resort to the courts as its only means of enforcing its rulings. Adequate bond must also be furnished by all common carriers. The following instance illustrates conditions as they now exist: The writer was in the office of one of our Public Service Commissions, when a local oil company called up to ask what could be done in a case where it had entrusted a shipment of oil to a certain duly licensed motor transport line for delivery C. O. D. The funds collected were not turned over to the oil company. The Public Service Commission could do nothing. That sort of motor transport will not prove helpful to the public!

In order to avoid making his paper too lengthy, the writer is forced to omit discussion of the other two subjects mentioned, the field of the bus and electric car, and the effect of motor operation on street and highway programs. These subjects are nevertheless just as important as the ones treated and bring into consideration some entirely different factors. The writer felt, however, that possibly less interest exists on the part of the Railway Club of Pittsburgh in the passenger and highway phases of the subject than in the freight transportation phase. The points discussed may be summarized as follows:

Summary of Points Developed

1. The transportation agency used must be a subordinate consideration, if the most efficient transportation is to be rendered.

2. Cost of operation, not rates, charged, is the proper basis for the comparison of the economy of transportation agencies.

3. Motor truck transportation is more economical than rail transportation for distances less than 15 to 25 miles.

4. Rail transportation is more economical than motor transportation for distances in excess of 50 to 150 miles. Transportation over distances between these limits is competitive.

5. The volume of the real competition between the railroad and the motor truck is small.

6. To determine whether the "short haul" is unprofitable the railroads must determine the "out of pocket" cost of this service. Until this data is forthcoming no statement that the "short haul" should be abandoned or retained can be substantiated.

7. Expansion of great freight stations in the congested portions of our large cities is against the public interest.

8. A probable development of the future is the supplying by every owner of a building designed to be occupied by commercial concerns, of adequate freight receiving service with equipment installed to handle demountable truck bodies, just as elevator service is furnished today.

9. Failure to improve existing transportation facilities through co-operation between all transportation units is quite likely to lead to government ownership, at least to the extent of public ownership of all road beds.

10. Factual investigations will quite frequently show that highway transport is not subsidized but is paying several times the cost of the highway used, including all damage done by the vehicles to the highway.

11. Regulation of all public utilities is essential.

12. Regulatory bodies must be given power by additional legislation to inflict summary punishment for violation of its rules.

PRESIDENT: Gentlemen, Professor McIntyre has presented a phase of transportation which is most interesting and most instructive and we would be very glad to have a full and free discussion of the entire subject.

MR. A. B. WHITE: Mr. President and fellow members of the Pittsburgh Railway Club: I feel that the speaker is to be congratulated. He has handled the subject in a fair, honest and scholarly manner and has left but little room for questions or comments. The statistics furnished are elaborate and have, no doubt, required a great deal of effort.

Many of the railroads have noticed the L. C. L. business slipping and have given the subject of motor transportation considerable thought, and I have every reason to believe that the figures given are correct. As I see it, the railroads can meet this competition only by adopting the same or improved methods of handling the short haul freight.

I do not believe I can add anything at this time that will be of interest.

PRESIDENT: Mr. Smith of the New York Central is here and we would be very glad to hear from him.

MR. H. E. SMITH: Mr. Chairman, I am very glad to be here and to have had the privilege of listening to the paper. But my activities are in such a different department of railroading that I would hardly feel competent to discuss the subject. There is one method of delivery in cities that I believe was not mentioned—the subways in Chicago. I understand that the Marshall Fields store was at one time opposed to it but finally extended their basement to reach the subway and I understand the stores generally are now in favor of it. It is something that does not appear before the public but it is busy every day and it has proven very efficient.

PRESIDENT: Mr. B. F. Fitch, President of the Motor Terminals Company, New York City, is with us tonight and we would like to have a word from him.

MR. B. F. FITCH: Mr. President and Members of The Railway Club of Pittsburgh:

The fundamentals disclosed by Professor McIntyre hardly warrant comments on such an instricate problem, especially by a motor truck exponent, before an audience of railroad talent.

On the train last night, while enjoying an excellent B. & O. special dinner, I reviewed September issue of Harper's Magazine, and noted therein a preface to article by Charles Pierce Burton, as follows:

"The value of the commodities constantly in transit is over one and a half billion dollars. If the average time in transit of all shipments could be reduced one day a saving of approximately twenty million dollars in interest charges would result."

In reading this article I found the following:

"In the year 1920, for example, in round numbers, a billion and a quarter tons of freight originated on the railroads of the United States. Divide that tonnage by the working days of the year, 305, and we have more than four million tons originated daily. If we multiply that tonnage by the average number of days in transit, which was five, we find that twenty and one-half million tons were constantly in transit during that year. The average value of all commodities during 1920 was $73 a ton, according to Government reports. Therefore, the value of the commodities constantly in transit was something like a billion and a half dollars, interest on which sum at 6 per cent is in excess of ninety million dollars annually. If the average time in transit in 1920 could have been reduced one day, it would have recuced the annual interest charge against the goods in transit by more than eighteen million dollars."

I think the above statement is the answer to "wild-cat" long distance competition of motor trucks suffered by our common carriers. The facor of "time" is the most important ingredient of production costs, therefore shippers have resorted to the DeLuxe service afforded by competing paralleling motor truck lines, regardless of costs thereof as compared with rail tariffs, for the purpose of establishing out-weighing industrial economies, which railroad transportation cannot appreciate, because the shippers', not the carriers', financial resources are more involved.

The shippers' loss for entransit delays is primarily interest charges, and secondarily, merchandise 90 per cent fabricated, which cannot be realized upon until the balance of 10 per cent is delivered. Under the circumstances transportation costs of this 10 per cent, as compared with frozen capital in the 90 per cent, is of slight consideration. On the other hand, carriers' losses are primarily represented by accruing per diem, and the allocation of rails occupied by each box car while it is discharging warehousing instead of transportation service.

The above reasons very logically account for the long distance truck competition suffered by our common carriers. Since the truck is a medium of transportation available to all, and one which has proven its time economies to industry, it cannot be legislated off the highways by corporate interests, and, therefore, the best way to handle the situation is that the carriers themselves adopt this new medium of transportation, and through more intensive operation perform the service at less cost to the shipper and at greater profit to themselves, than is possible by any of these "wild-cat" competitors.

Cincinnati was referred to tonight by Professor McIntyre. As the father of that operating program, under which trucks have proven their service betterments to shippers and economies to carriers, I take the liberty of further explanatory comments, and then visualize how the initial Cincinnati practice can be extended for greater and better returns to shipper and carrier alike.

The principal cities of the United States are located on waterways, as Professor McIntyre mentioned. These cities originally were hamlets, whose location was prompted by the only available transportation—waterway. When railroads were projected to such cities, stations were located as near as possible to waterway terminal facilities, thereby assessing, at traffic loss, no disproportionate vehicular transportation costs on shippers. The history of this and every other country is, that population has invariably followed transportation facilities, hence the growth of our early American hamlets to our present industrial centers.

Cincinnati is but emblematic of every other large industrial center. Rails there were projected to the strategic center of the original hamlet, as they were likewise here at Pittsburgh. The influence of the short vehicular haul developed industrial activities adjacent to freight terminals. Resultingly, realty values soared, and when such industries demanded expansion opportunities, they found adjacent realty was at prohibitive cost. Through this influence, industry re-established itself at all commercial centers in suburban zones, where siding facilities were possible. The outcome of such was the development of specialized vocational talent in each of these suburban zones, and the logical result was the creation of additional competitive interests, all desiring to utilize this vocational talent, but few of whom could secure siding facilities.

To accommodate these smaller volume producers, the railroads established suburban zone stations. In addition to taking care of the less carload shippers originating freight in these various industrial outskirts, such zone stations tended to increase platform facilities and resultingly decrease congestion of main freight stations centrally located. It is thus evident that the economy incentive, namely: "Short vehicular haul," which originally influenced the location of freight stations as near as possible to the strategic center or hub of each city, has, through expansion, been reversed, to the end that now the majority of freight tonnage would suffer a long vehicular haul from the rim or felloe of each industrial city to the main station at the hub, were siding facilities and sub-stations not afforded the shipper.

The same realty values, which made impossible industrial expansion adjacent the hub, likewise make impossible, except at prohibitive capital expense, terminal station expansion, therefore, as a make-shift, with railroad equipment alone available for intra-terminal cartage (the use of which was developed and further projected by inter-line competition) existing terminal practice was justified until advent of a newer and more flexible type of transportation—the motor truck.

To best visualize this terminal practice, please consider the following undeniable facts. The destination car set-up of all railroads is at their main stations, located at the hub or strategic center of each city. Full industrial siding carload shipments to destination or common points beyond the terminal, aside from switching, impose but slight complications, but the diversified carloadings of such industries with shipments for delivery at local way points on rails of all contributing lines must be destined to the main freight station, for re-handling to connections and to local way points on the originating line. In addition, the station freight from such zone centers must be similarly handled. All of this amounts to nothing more or less than vehicular service demands, discharged with railroad equipment.

Over and above this picture of the prostitution of long haul tonnage units, you must bear in mind that each and all of these zone stations, where possible, consolidate a car to destination point or some transfer point beyond the terminal, and later these loadings suffer a re-handling the same as an intra-terminal car to the main station, with the single exception that the over-loaded station at that industrial point of origin is spared congestion to the extent that cars may be dispatched to transfer beyond, and the initial railroad enjoys some line haul returns therefrom, but, even so, the contents of such car have to be rehandled at carrier's expense for distribution of its consolidated loadings into destination cars.

It is thus evident, that the movement of so many duplicated cars from duplicated stations within any one terminal, to duplicated station deliveries in any other terminal or terminals, has developed a kaleidoscopic retail demand beyond economic discharge by dependence only upon the carrier's wholesale equipment. It is the complexity of these individual intra-terminal carload demends which confiscate trackage, to detriment of the free and easy movement of consolidated switch cuts and trains.

Our installation at Cincinnati was to eliminate the above described intra-terminal car, which in different territories is designated as a "trap," "transfer" or "ferry" car. A railroad analysis proved that the average duration of movement of such, between all freight stations of all contributing railroads was three days, and the average contents of each car was but eight tons. That freight is now being carried in containers by motor trucks over city streets within an average of 20 minutes. Twenty minutes is the duration between signatures of forwarding and receiving line tallymen. The freight available for such container movement arrives in the morning, is interchanged, loaded in cars and leaves in the evening. This is clearly a time economy of two days on all sub-station and interchange freight. If every large industrial center in the United States enjoyed similar facilities, it is evident from Mr. Burton's statement that thirty-six million dollars in interest charges could be saved for shippers.

Now, disregarding the apparently unappreciated necessity of expediting shipper's freight, with its unquestionable resulting economies, according to the railroad analysis previously referred to, the carriers themselves enjoy an operating economy of 32 cents per ton. Greater than this are the reciprocal benefits, which cannot be estimated in dollars and cents, namely: Extension of terminal plant tonnage capabilities, less capital expense, total elimination of platform, station rail, terminal rail and shippers vehicular congestion, all too technical to be verbally explained. The subject is one of "continuous" vs. "interrupted" movements, by which I mean, freight cars when loaded cannot be switched until end of station working day, whereas containers when loaded can be immediately dispatched to freight station of the connection, thereby immediately relieving station rails or platform of forwarding line of its occupancy, without in any wise congesting outbound platform of receiving line by reason of its delivery, because when delivered the freight is immediately trucked into outbound cars, which must be spotted on station rails throughout the period of station working day, to receive freight from either shippers or connections.

So far I have only talked of the illegitimate use of wholesale box car equipment for retail intra-terminal trucking demands. There is another evil which tends to reduce the established national average of box car loadings and mileage, namely: Local-way service within a radius of 100 miles of our industrial centers. This local-way or peddlers car service is at enormous cost to the carriers. I doubt if tariffs would cover the costs, but for the fact that the carriers, either prior to distribution or after collection, enjoy long haul profitable returns from such local-way freight.

It is truck competition in such field which is most greatly decried, because while the carriers thereby lose the volume of freight originating at the industrial center, they, nevertheless, have to maintain the cost of the service for that portion of the freight destined to these local way points, which originates at points on their or the rails of other railroads beyond the industrial center. It is thus obvious that for the DeLuxe truck service enjoyed, shippers pay a higher rate, and for the decreased volume of local-way freight, carriers suffer a higher cost. This is primarily chargeable to the fact that in absence of co-ordination of common carriers and trucking interests, competitive service is maintained, whereas, in reality, the carriers themselves should perform such transportation obligations both by box car and truck, allocating each to its field of most economic operation.

As Professor McIntyre has so ably pointed out, the radius for ecomonic truck competition with railroads is most elastic, because effected by classifications, tariffs and the public appreciation of the factor of time. Further, I would like to especially call to your attention that a motor truck has its terminal costs, as well as a railroad.

Now comparing the two. Our operating experience is that the minutely cost of each of our truck units with driver on seat available for service is .0416. In addition, there is wheelage cost when moving. At Chicago the clocked unloading and reloading delay per vehicle is 54 minutes. There is, logically, a similar delay at shipper's end of haul, hence, 54 minutes can be accepted as a fairly accurate average of truck delays, per trip, under intensive operation. Roughly computed 4 cents per minute multiplied by 60 minutes is $2.40 per trip terminal expense, which, divided by our average of 4-ton loads, is a cartage cost of 60 cents per ton before you start to truck. To eliminate such, we adopted the containers and hoists which alone make possible continuous operation of the motor truck or power unit, which to all intents and purposes, functions for our containers as a switch engine does for box cars. As against this, the Ohio-Indiana Rate Case Study definitely proved that terminal costs confiscated 64.7 per cent of L. C. L. receipts of our carriers, and the average length of haul in that territory was but approximately 54 miles.

At Cincinnati we find it difficult to profitably work under tariffs comparable with carriers switching or local-way tariffs beyond a 10-mile radius, despite the fact that our trucking is assessed with no terminal delay expense. Such experience prompts the belief that long haul competition with the carriers is at shippers' expense, or, in other words, a DeLuxe service for which they are willing to pay, as they are for express service.

Since extension of what we have proven at Cincinnati, in intra-terminal service, is desired by the carriers to local-way service, and since the motor truck cannot profitably operate within carrier's tariffs, some missing link in transportation is necessary to cover the field between this limited zone of truck operation and the area which must be taken care of to the zone where profitable rail transportation commences.

Everything so far discussed is based upon actual practice. Now let me paint a picture for you on such background. When freight is loaded in containers, it is available for movement by motor truck or car. The rails adjacent to all industrial centers are taxed to utmost capacity by through train movement demands. In most instances carriers' rails are paralleled by interurban rails, which are practically idle six to eight hours daily, during the period of carriers' greatest train dispatch activities. Why not utilize such facility for local-way movement of containers, to carriers' relief and economy. As a by-product, on a ton-mile basis, beyond a radius of say five or ten miles and within a radius of 100 miles, container lots of local-way freight can be profitably moved at much less expense by traction lines than by common carriers.

The Pittsburgh district develops larger tonnage demands on contributing railroads than any locality I know of. Some 140 agricultural and industrial towns within a 100 mile radius make necessary a local-way freight service to detriment of volume tonnage opportunities of our carriers. Within that zone Pittsburgh has a wonderful net work of traction lines, which, through instrumentality of the unit container, can be utilized as a facility of our common carriers, less all capital expense, just as motor trucks were at Cincinnati.

The missing links in this net work of co-ordinated trackage can be supplied by the truck over highways, and the very short hauls can likewise be discharged by the truck. The suggested program is, to "container" your interchange and local-way freight in Pittsburgh territory as we have the inter-station freight at Cincinnati, extending our ten-mile truck service, through co-ordinating traction lines, to embrace a 100 mile radius. It is feasible, and as a program amounts to only capitalizing existing facilities to maximum extent, in preference to otherwise unavoidable investments covering increased facilities to take care of your assured industrial growth.

In such co-ordination program, in addition to the above discounting of capital expense demands, the operating formula would be to move container lots of freight on any and all existing mediums of transportation—railways, waterways, highways or traction lines—utilizing each within its zone of most economic operation, less labor expense when mechanically trans-handling from either to the other.

I thank you.

PRESIDENT: Mr. Redding, have you anything to add?

MR. D. J. REDDING: Mr. President, this is a subject with which I cannot pretend very much familiarity, as I am not a transportation man. I spend all of my time trying to keep locomotives in condition to haul this freight that we are talking about, from one terminal to another. However, I do believe that the solution of terminal congestion in the large cities can only be solved by better methods of distribution. I have heard something of the operation of the Container System in operation in Cincinnati, concerning which Mr. Fitch has just told us, and I have been told that that system is working out very satisfactorily. I do not know that it has been introduced very extensively elsewhere, although I am told that quite a lot of mail is being handled between New York and Chicago in containers and that it is handled more quickly and economically in that way than by any other method.

It would seem as though the railroads should develop very close relationship with the traction lines in the cities and with the various trucking systems in order to relieve this congestion, which from the story developed in Professor McIntyre's paper is a very serious matter in some of the large terminals, and where it would seem that mere enlargement of the freight terminal does not solve the problem, as there is still freight to be hauled in some other method than in freight cars. I must say that the figures quoted by Professor McIntyre, showing the distance over which trucks can be operated economically, has been very surprising to me. I have been one of those who have felt that trucks were given a very unfair advantage over the railroads, in that the taxpayers provided the road way for the trucks, where the railroads were obliged to stand the entire expense for their own road bed, and I have not yet quite comprehended the significance of the figures quoted in the paper, and which I think would indicate that these trucks are paying more than their just proportion of maintaining cost of road ways.

It would seem that the logical solution of this problem would be for the railroads to not merely take freight from a terminal in one city and deliver it in another city, but that they might, in conjunction with traction and truck lines, take it from a man's store in one city and deliver it in another city at the store for which it was destined, and thereby be in better position to keep freight moving continuously from the time it was loaded for delivery until delivery had been made, although that would involve in many cases, closer co-operation between the railroad, consignor and consignee; the two latter to maintain larger warehouses or better storing facilities, relieving to that extent the necessity for the railroad to maintain large freight houses or terminal warehouses in which to a very considerable extent, they are now carrying stock for merchants and manufacturers, and as the tendency of the age seems to be for the greater concentration of people in large cities and restricted areas, it is apparent that this question of congestion and delays in handling freight through such cities will become more pronounced in the future and can only be solved by better methods of delivery.

MR. T. FITZGERALD: As an electric railway man it would be presumptuous of me to attempt to tell steam railroad men how I think they should conduct their business But, one of my associates, a former steam railroad man, Mr. A. C. Spurr, several years ago suggested that we utilize the container in connection with our street railway facilities to assist the railroads in the handling of their short haul. l. c. l. business, which is largely a terminal problem.

Mr. Fitch has just struck the keynote of our opportunity to serve, that is, the utilization of our facilities between midnight and 6:00 a. m., when they are practically idle. At a comparatively small additional investment cost we can place these present facilities at the service of the steam railroads of the district to by-pass the l. c. l. freight around their congested city terminals. As I understand it from what has been said, terminal operations are eating up a large portion of the profits from freight operations on the steam railroads.

The l. c. l. freight, which is now being handled by trap cars between the city terminals, traveling as far as 67 miles to reach a station two blocks away, can more efficiently be handled by the container method. To reach the outlying points, electric railway switches could be run alongside the steam railroad stations and the containers placed on flat cars and moved to destination between midnight and 6:00 a. m., thus relieving city terminals and lessening the expense of their operation.

This may sound like moonshine to you, but if we are right, we are at your service.

MR. B. F. FITCH: Unfortunately that was bonded liquor.

MR. FRANK J. LANAHAN: Seriously, this subject we are discussing tonight, which has been so well presented to us, is a matter that is engaging the entire country. While attending as a delegate, the annual meeting of the United States Chamber of Commerce, I observed that this was the dominating question of that body, representing the business interests of the entire country. In their efforts to intelligently solve the transportation problem and satisfy rail, water and motor interests to the mutual benefit of all concerned, intelligent analysis was made of the whole problem. An effort is being made for the sinking of all animosity that has heretofore existed and an equitable adjustment of differences that have occasioned friction. That you may better understand the scope of the work undertaken, it is but necessary to mention that the general committee on transportation has been divided into numerous sub-committees, the titles of which thoroughly indicate their functions. First is the committee on "Government Relations to Transportation," of which Mr. Geo. A. Post is chairman. Another committee is on "Railroad Consolidations." To look into this, Mr. Carl R. Gray, president of the Union Pacific System, is chairman. The "Readjustment of Relative Freight Rate Schedules" has been assigned to a committee of which Mr. F. A. Delano is the chairman, while the "Relation of Highways and Motor Transport to Other Transportation Agencies" has been assigned to Mr. A. W. Swayne. Our fellow townsman, Mr. W. L. Clause, head of the Board of the Pittsburgh Plate Glass Company, is chairman of a committee to look after the "Development of Waterways and Co-ordination of Rail and Waterway Service."

It is confidently expected that at the next meeting of the Chamber there will be submitted a report that will be acceptable to the diverging interests, and the adoption of the policy suggested will bring to an end the turmoil that has been disturbing industrial and financial circles for so many years.

The containers that Mr. Fitch so eloquently alludes to are no strangers to the members of the Railway Club. It was our good fortune to listen to a presentation of a paper by Mr. F. S. Gallagher, engineer of rolling stock of the New York Central Lines, at a recent meeting in this very room. This subject of handling small consignments of freight opens up to all of us many ideas in transportation that ultimately should be of great benefit to consignee and consignor and the transportation lines as well.

It would be a pity not to push to the highest point of efficiency a manner of handling small consignments, for it is realized the present methods are not alone costly to the railroads, but so unsatisfactory to their patrons. The suggestion of street railway help as depicted by Mr. Fitzgerald, certainly seems reasonable and at least is worthy of thorough investigation and careful study.

PRESIDENT: Is there any further discussion? If not, have you anything you wish to add before the discussion is closed, Mr. McIntyre?

Prof. L. W. McIntyre: I have nothing else to add.

MR. A. E. ANDERSON: We have had a very interesting discussion of this matter, but the impression I got from the speaker's remarks was that he had just about twice as much more to give us sometime if we ask him, because he omitted two important subjects. Therefore the Program Committee should not lose sight of that fact for the future use of the club during the season.

The discussion has been very illuminating. There is only one matter that has occurred to me, the question of depreciation as between truck operation and railroad operation. I do not know how far the gentlemen have gone into that but a truck depreciaetes far more rapidly in use and should be figured more heavily on the question of ultimate cost than what would apply to railroad operation. It is too late to go into that now. Therefore I would like to make a motion that we extend a rising vote of thanks to the speaker of the evening and include in that also Mr. Fitch for his detailed description of the experience in Cincinnati in supplementing what Mr. McIntyre has said.

(The motion prevailed unanimously by all members rising).

PRESIDENT: We will now hear the report of the Nominating Committee.

The Chairman of the Nominating Committee, Mr. D. M. Howe, read the report of that committee for officers for the ensuing year, as follows:

PRESIDENT

George D. Ogden, Traffic Manager, Pennsylvania System, Pittsburgh, Pa.

FIRST VICE PRESIDENT

A. Stucki, Engineer, Pittsburgh, Pa.

SECOND VICE PRESIDENT

E. V. Williams, Superintendent Motive Power, Buffalo, Rochester & Pittsburgh Railway Co., DuBois, Pa.

SECRETARY

J. D. Conway, 515 Grandview Avenue, Pittsburgh, Pa.

TREASURER

F. H. Stark, Traveling Car Inspector, Pittsburgh & Lake Erie Railroad Co., Pittsburgh, Pa.

EXECUTIVE COMMITTEE

L. H. Turner, Special Representative to Vice President, Pittsburgh & Lake Erie R. R. Co., Chairman.

D. J. Redding, S. M. P., Pittsburgh & Lake Erie R. R. Co.

F. R. McFeatters, General Superintendent, Union R. R. Co.

A. G. Mitchell, Secretary, Association of Transportation Officers of the Pennsylvania System.

F. M. McNulty, Rosslyn Farms, Carnegie, Pa.

J. G. Code, General Manager, Jefferson Southwestern R. R. Co.

D. M. Howe, Railway Supplies.

J. A. Spielmann, Asst. to General Superintendent, Baltimore & Ohio R. R. Co.

H. H. Maxfield, S. M. P., Pennsylvania System, Southern Division.

Frank J. Lanahan, President, Fort Pitt Malleable Iron Co.

Samuel Lynn, Master Car Builder, Pittsburgh & Lake Erie R. R. Co.

D. F. Crawford, Vice President, Locomotive Stoker Co.

FINANCE COMMITEE

E. C. Sattley, Vice President, Champion Sales Co., Chairman.

C. O. Dambach, Vice President & General Manager, Unity Railways Co.

E. A. Johnson, General Sales Manager, Duff Manufacturing Co.

E. J. Searles, Schaefer Equipment Co.

Geo. W. Wildin, General Manager, Westinghouse Air Brake Co.

RECEPTION COMMITTEE

F. H. Freshwater, Sales Agent, Pressed Steel Car Co., Chairman.

W. E. Fowler, Jr., Sales Representative, Davis Brake Beam Co.

J. E. Haynes, Standard Steel Spring Co.

J. L. Smith, General Foreman, Pittsburgh & Lake Erie R. R. Co.

S. E. VanVranken, Purchasing Agent, Locomotive Stoker Co.

H. M. Wolf, Road Foreman of Engines, Pittsburgh & Lake Erie R. R. Co.

MEMBERSHIP COMMITTEE

J. A. Ralston, Mechanical Engineer, Union R. R. Co., Chairman.

H. E. Chilcoat, Manager, Clark Car Co.

A. D. Chittenden, Superintendent Transportation, Bessemer & Lake Erie R. R. Co.

J. L. Cunningham, S. M. P., Pennsylvania System.

E. J. Devans, General Superintendent, Buffalo, Rochester & Pittsburgh Ry. Co.

Harry B. Kelly, General Road Foreman of Engines, Pittsburgh & Lake Erie R. R. Co.

F. G. Minnick, Asst. General Manager, Pittsburgh & Lake Erie R. R. Co.

ENTERTAINMENT COMMITTEE

E. Emery, Railway Supplies, Chairman.

Henry F. Gilg, Sales Manager, Penn Iron & Steel Co.

Jos. H. Kummer, Supt. Orders, Fort Pitt Malleable Iron Co.

SUBJECT COMMITTEE

John F. Lent, Traffic Counsel, Chairman.

E. B. DeVilbiss, Master Mechanic, Pennsylvania System.

Wm. J. Knox, Mechanical Engineer, Buffalo, Rochester & Pittsburgh Ry. Co.

Chas. Orchard, Traffic Department, Carnegie Steel Co.

John B. Wright, Asst. District Manager, Westinghouse Air Brake Co.

Upon motion, duly seconded, the report of the Nominating Committee was accepted and the Secretary instructed to forward the record of ballots to the members by mail, it being understood that any member of the club is privileged to nominate any person for an office if he is not satisfied with the nominations of the committee.

There being no further business, upon motion the meeting adjourned.

J. D. CONWAY, Secretary.

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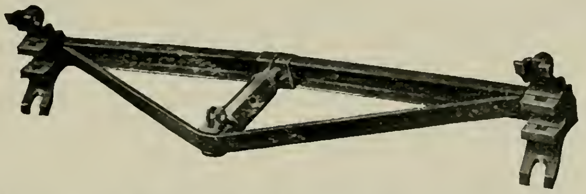

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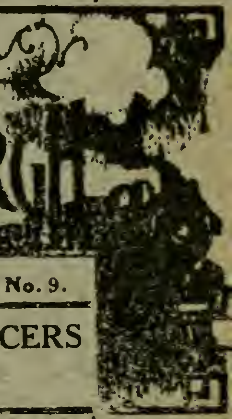

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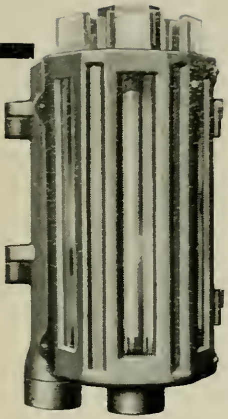

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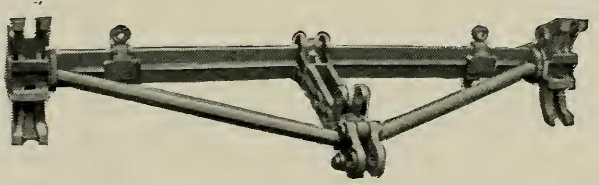

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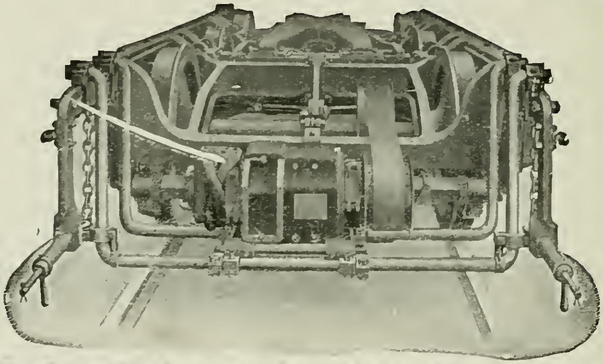

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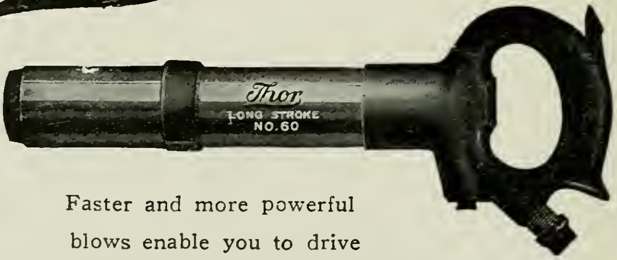

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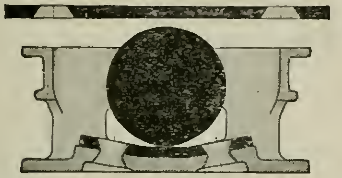

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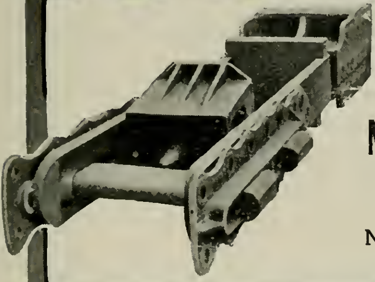

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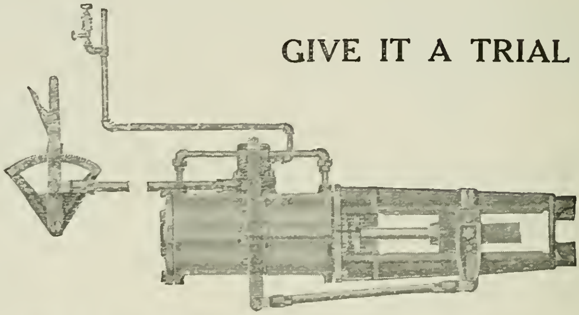

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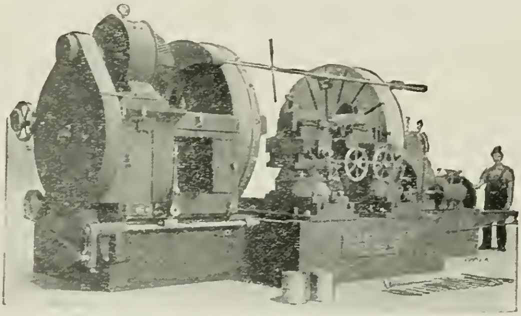

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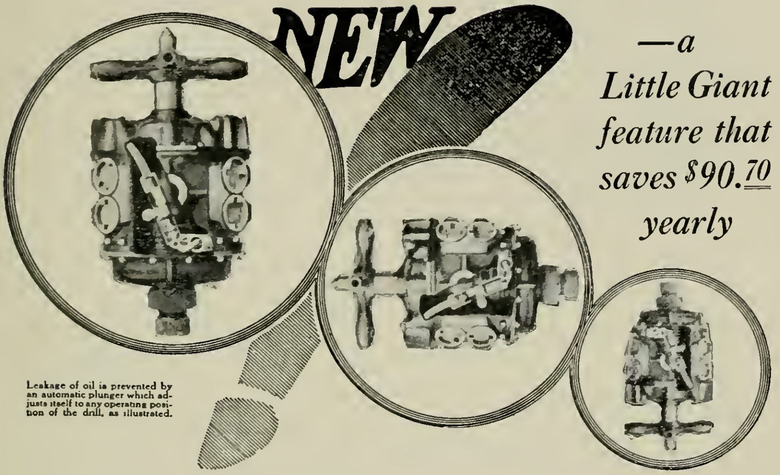

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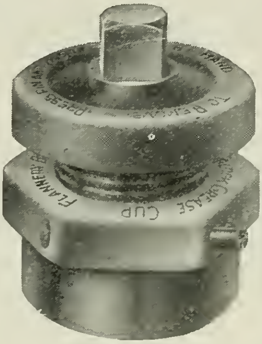

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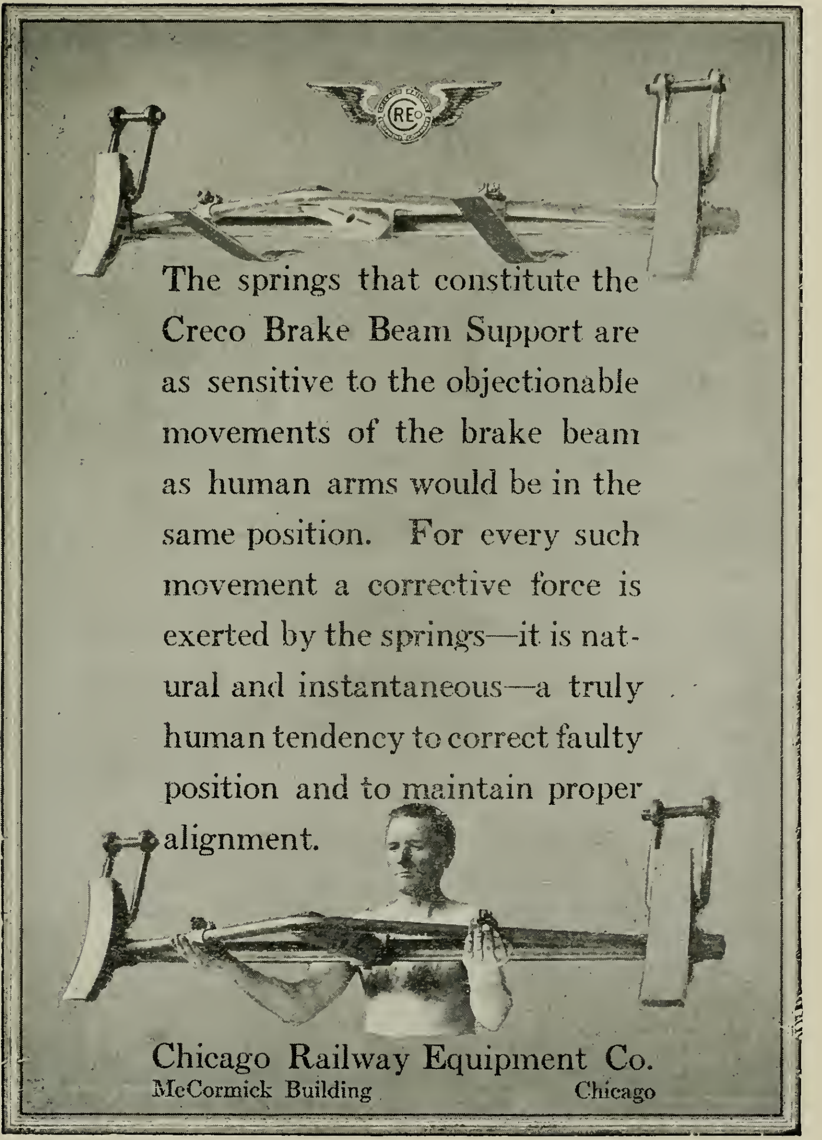

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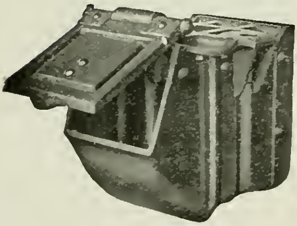

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Vol. XXII
No. 9

Pittsburgh, Pa., Oct. 25, 1923

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*—Deceased.

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Huchel, Wm. J.
Hughes, J. E.
Hughes, Wm.
Hultman, C. H.
Hussong, Albert C.
Jacobs, M. H.
Johnson, E. A.
Jungbluth, Adolph
Karam, I. A.
Kasnitz, J. J.
Kasnitz, Jesse
Kegel, A. E.
Kelley, Henry D.
Kelly, H. B.
Kelly, Leo J.
Kempton, J. W.
Keptner J. B
Kinch, L. E.
Kindle, W. F.
Kirkpatrick, H. F.
Kohute, H. G.
Krepps, T. S.
Kroske, J. F.
Kummer, Jos. H.
Laird, Geo. R.
Lanahan, Frank J.
Lanahan, J. S.
Lang, W. C.
Laughner, C. L.
Laurent, Geo. F.
Laurent, Jos. A.
Lehr, Harry W.
Lent, John F.
Livingston, E. M.
Lobez, P. L.
Lohr, Allen W.
Long, R. M.
Lowe, W. D.
Lower, N. M.
Ludwig, C. F.
Lynn, Samuel
Lynn, William
Maliphant, C. W.
Manogue, W. T.
Matchett, H. K.
Meeker, H. B.
Merscher, John
Millar, C. W.
Miller, James
Mitchell, Frank K.
Mitchell, Thos. J.
Mode, H. C.
Moran, J. V.
Moreland, E. L.
Morris, J. H.
Moyer, Oscar G. A.
Murphy, W. J.
McCloskey, J. C.
McCully, B. N.
McDermitt, E. E.
McGaughey, John V.
McKinstry, C. H.
McKirahan, J. R.
Newman, J. F.
Nicodemus, Earle H.

Nieman, H. L.
Noonan, W. C.
North, D. P.
O'Brien, M. J.
Ogden, Geo. D.
Orchard, Chas.
Osborne, L. E.
Painter, Joseph
Paisley, R. M.
Parke, F. H.
Parker, W. G.
Partington, Joshua A.
Passino, F. J.
Passmore, H. E.
Pehrson, A. K.
Phillips, W. H.
Price, W. F.
Proft, J. W.
Provost, S. W.
Ralph, W. E.
Rankin, B. B.
Redding, D. J.
Redding, R. D.
Reich, F. C.
Renshaw, W. B.
Reynolds, D. E.
Rick, R. C.
Robbins, F. S.
Robinson, R. L.
Roth, Philip J.
Ryan, D. W.
Sattley, E. C.
Schrecongost, C. P.
Schuchman, W. R.
Seibert, Wm. L.
Sewell, H. B.
Shannon, D. E.
Shellenbarger, H. M.
Sheridan, T. F.
Shultz, G. J.
Skuce, C. G.
Smith, J. L.
Smith, Robert M.
Snyder, J. W.
Snyder, Joseph
Sowash, F. E.
Spielmann, J. A.
Stahlman, M. C.
Stamm, B. B.
Stark, F. H.
Stenson, Geo. A.
Stevens, L. V.
Stoller, Karl M.
Stucki, A.
Suckfield, G. A.
Sutherland, Lloyd
Temple, H. H.
Ternent, H. J.
Thomas, G. N.
Thompson, L. D.
Thurlby, A. R.
Trueblood, H. J.
Tucker, John L.
Turner, L. H.
Walter, W. A.
Walther, G. C.
Warrensford, Fred S.
Weissert, W. J.
Widmeier, L. W.
Wildin, G. W.
Willoughby, F. R.
Wilson, D. L.
Winell, Karl O.
Wright, John B.
Zilian, R. F.
Zimmerman, S.

VISITORS

Abercrombe, W. H.
Ackerman, H. R.
Ainor, J. C.
Allcroft, C. E.
Allerton, H. N.
Anderson, Harry
Anderson, J. H.
Andres, Fred
Anger, John G.
Bailey, C. C.
Barclay, J. G.
Barnhart, S. E.
Beck, W. J.
Bell, R. P.

Bennett, Jas. G.
Bennett, T. W.
Bernett, H. C.
Bevan, Geo. W.
Bevan, P. A.
Beymer, G. H.
Bishop, M. L.
Bissell, A. G.
Bochert, Carl G.
Boucher, L. H.
Bosley, N. D.
Boyd, W. R.
Brandon, H.
Brannan, John F.
Brinkhoff, W. H.
Bull, R. S.
Burgess, T. S.
Callahan, F. J.
Calvert, John
Campbell, D. C.
Carmer, C. T.
Carroll, Walter S.
Christiansen, Wm.
Christy, Wm. J.
Clark, Chas.
Clifford, E. T.
Clinton, M. K.
Cobbett, Albert J.
Craig, James A.
Crist, C. M.
Crouse, J. M.
Crux, Clarence A.
Custer, C. F.
Custer, Elmer J.
Davin, Chas. J.
Deramo, George
Deyoe, D. H.
Dickinson, Frank H.
Dotterweich, E.
Dougherty, John J.
Douglas, P. A.
Doyle, Edgar C.
Driscoll, Francis X.
Duerr, J. B.
Dugan, M.
Dugan, Thomas
Durkin, T.
Durkin, Thos. J., Jr.
Durner, Harold F.
Eberlein, J. F.
Elkin, W. C.
Elliott, C. A.
Ensminger, Edgar
Evans, W. J.
Faix, Jos.
Farrell, H. E.
Field, C.
Fields, D. L.
Filler, Wm.
Finnin, Wm. B.
Fisher, John J.
Fisher, Raymond C.
Fitzpatrick, J. A.
Forrester, Jas. B.
Frauenheim, A. M.
Frazier, L. E.
Frey, H. H.
Fritz, A. C.
Fulton, James
Funcke, H.
Fyke, F. C.
Galbraith, Robert M.
Galloway, C. L.
Gasche, K. W.
Geiesler, Ivan
Gellinger, C. W.
Genet, G. J.
Geyer, H. L.
Gibb, W. H.
Gillen, J. B.
Goldstrum, G. E.
Gollman, Chas. W.
Graham, J. A.
Graham, Wm.
Granger, A. W.
Gray, John
Griffin, Thomas G.
Gross, Jas. C.
Groves, David
Guild, T. A.
Gunnison, W.
Guyton, Clarence
Haller, Nelson M.
Hallstein, Geo. W.
Hallstein, H. F.
Hanhauser, A.

Hanscom, J. Richard
Harmon, H. A.
Harris, A. L.
Harvey, W. B.
Hasper, W. C.
Hassenfritz, G. O.
Hayward, Cyril
Helbling, C. L.
Herlehy, D. T.
Herrold, A. E.
Hewertz, E.
Hillman, Wm. E.
Hoerner, A. L.
Holcomb, R. C.
Holliday, Harry
Holmes, R. B.
Hoover, J. W.
Hoover, R. C.
Horn, Harold J.
Howe, Harry
Hulick, E. G.
Hull, S. R.
Hummel, Chas. E.
Hutchinson, D. I.
Jackson, G. P.
James, David W.
Jex, W. F.
Johnson, Ira
Joy, Joseph
Joyce, T. J.
Kamerer, R. W.
Kammerer, Walter
Kelley, Henry T.
Kelly, J. A.
Kennedy, W. R.
Ketchpel, Paul A.
Kilborne, Wm.
Kilroy, J. R.
Kinch, Donald L.
Kirkpatrick, W. R.
Lang, Norman E.
Larsan, John
Laufman, C. M.
Laughlin, R. J.
Laurent, A. J.
Leeper, Jas. A.
Licek, Frank E.
Lincoln, T. T.
Lippincott, C. H.
Little, W. O.
Lloyd, D. W.
Lowery, Dr. Jos. E.
Lyons, J. C.
Mahan, W. C.
Marshall, P. E.
Marx, Frank J.
Marx, Gilbert J.
Mausson, R. C.
Metzger, C. L.
Meyer, Fred
Miles, C. D.
Millard, W. H.
Miller, A. E.
Miller, George
Miller, H. L.
Miller, L. L.
Mitchell, Thos. J. Jr.
Morrissey, J. W.
Mutzig, Paul B.
Myers, Arnold
McClatchey, J. W.
McComish, W. C.
McConnell, John J.
McCune, C. A.
McCurdy, Lloyd V.
McLaughlin, Jas. M.
McNabb, J. Jr.
Nearbroad, H. O.
Nelson, W. M.
Norton, A. A.
O'Brien, R. J.
O'Connor, M. J.
O'Donnell, J. R.
Oliver, W. E.
O'Neil, J. T.
Orme, Geo. G.
Orme, John L.
Owens, J. W.
Paleos, Geo.
Penman, J. T.
Perkins, F. R.
Phlegan, A. B.
Pickels, H. D.
Pillar, Mike
Plank, L. G.
Plumley, Stewart

Poole, H. C.
Provost, W. J.
Rabold, G. H.
Ralston, John
Rauschart, Edw.
Record, J. F.
Reed, C. R.
Reese, R. H.
Reblin, T. G.
Remensnyder, E. J.
Ridgway, Edwin H.
Riley, Thos. A.
Ring, L. M.
Ripper, Paul Z.
Robeck, George
Roberts, Clay W.
Rodgers, Joseph W.
Rodgers, Robert
Rogers, Fred E.
Roth, J. A.
Rott, L. E.
Rowe, E. B.
Rush, J. H.
Russell, W. A.
Ryce, E. C.
Sapinger, H. B.
Saxman, H. S.
Schmid, A. H.
Schohn, Louis
Schreiber, C. R.
Schubart, B. G.
Schuchman, B.
Schuster, E. F.
Schweitzer, A. C.
Seif, L. P.
Semler, Elmer H.
Shaffer, Geo. C.
Sheets, T. A.
Sherry, R. S.
Shirner, J. H.
Shweis, Walter H.
Shropshire, Paul
Sieffert, Wm. F.
Siemon, E. J.
Sisler, Horan
Skiles, Wm. C.
Slack, W. A.
Smith, Andrew
Smith, E. H.
Smith, H. S.
Smith, O. E.
Smith, Sion B.
Snyder, W. H.
Southworth, E. T.
Spear, A. E.
Spraragen, W.
Strickler, F. M.
Stritzenger, Frank
Sullivan, Jos. E.
Sundholm, F. J.
Swanson, Carl A.
Thomas, Leroy
Thompson, O.
Thornton, H.
Toomey, W. F.
Tracy, T. M.
Uler, C. E.
Vonia, Geo. F.
Van Dalsim, J. T.
Warner, W. L.
Waterman, E. H.
Wells, A. T.
Wells, Franklin H.
White, E. M.
Wibner, A. J.
Williams, J. E.
Williams, W. G.
Willinghun, J. A.
Witt, L. Oscar
Wood, E. O.
Woodburn, C. D.
Wright, E. W.
Yermak, P. S.
Young, F. C.
Zapf, Joseph

The call of the roll was dispensed with, the record of attendance being obtained through the registration cards.

The reading of the minutes of the last meeting was dispensed with as they are to appear in printed form.

The Secretary read the following list of applications for membership:

Barclay, J. G., Salesman, Garratt-Callahan Co., 2328 W. Delaware, St., Indianapolis, Ind. Recommended by John D. Conway.

Beam, E. J., Car Builder, Pennsylvania System, 577 Fourth St., Pitcairn, Pa. Recommended by E. M. Livingston.

Boyer, Jay D., Machinist, Verona Steel Castings Co., 500 Fifth St., Oakmont, Pa. Recommended by F. R. Willoughby.

Brady, H. K., Supt. Labor and Wage Bureau, Penna. System, 720 Penna. Station, Pittsburgh, Pa. Recommended by W. H. Rhodes.

Brandon, Howard, E. H. Foreman, Montour Railroad, Coraopolis, Pa. Recommended by E. A. Rauschart.

Christiansen, William, Dist. Service Rep., Loco. Feed Water Heater Dept., Worthington Pump & Machinery Co., 736 Hill Ave., Wilkinsburg, Pa. Recommended by C. G. Skuce.

Clement, M. W., Gen. Mgr., Pennsylvania System, Pennsylvania Station, Pittsburgh, Pa. Recommended by Geo. D. Ogden.

Davidson, D. B., Gang Fore., Penna. System, 114 Walter St., Derry, Pa. Recommended by C. B. Gray.

Faix, Joseph, P. W. I. F., P. & L. E. R. R., 637 Michigan Ave., Glassport, Pa. Recommended by John Merscher.

Fisher, John J., Trav. Car Insp'r, Union Railroad, 7429 McClure Ave., Swissvale, Pa. Recommended by A. F. Coulter.

Gurley, L. R., M. P. Insp'r, Penna. System, 506 Penna Station, Pittsburgh, Pa. Recommended by C. T. Hoffman.

Hanscom, J. Richard, Draftsman, Montour Railroad, 1100 Fourth Ave., Coraopolis, Pa. Recommended by E. A. Raushcart.

Herlehy, David T., P. W. I. F., P. & L. E. R. R., 817 Vermont Ave., Glassport, Pa. Recommended by John Merscher.

Hoover, Robert C., Machinist, Penna. System, Pitcairn, Pa. Recommended by J. F. Courson.

Judge, James, Gang Fore., Penna. System, 1204 Resaca Place, N. S., Pittsburgh, Pa. Recommended by R. C. Reick.

Karam, I. A., M. P. Insp'r, Penna. System, 204 Penna. Station, Pittsburgh, Pa. Recommended by C. G. Skuce.

Kegel, Arthur E., Chf. Acct. Clerk, Penna. System, 731 Bryn Mawr Road, Pittsburgh, Pa. Recommended by A. W. Abel.

Laughlin, Richard J., Asst. C. C., Penna. System, 1470 Edgehill Ave., Dormont, Pittsburgh, Pa. Recommended by A. W. Abel.

Lewis, Herbert, U. S. Gov., Insp'r, Int. Com. Commission, 100 Bowman Bldg., Pittsburgh, Pa. Recommended by E. A. Rauschart.

Marshall, Paul Emerson, Loco. Insp'r, Montour Railroad, 910 Fifth Ave., Coraopolis, Pa. Recommended by E. A. Rauschart.

Milliken, C. C., Asst. Traffic Dispatcher, Carnegie Steel Co., 806 Carnegie Bldg., Pittsburgh, Pa. Recommended by Chas. Orchard.

Moeller, W. C., Agent, American Rwy. Express Co., 400 N. Mathilda St., E. E., Pittsburgh, Pa. Recommended by Sam A. Damore.

McConnell, John J. P., Special Clerk, Penna. System, 5206 Butler St., Pittsburgh, Pa. Recommend by A. W. Abel.

McNeill, J. Edward, Asst. Chf. Lineman, Penna. System, 304 Fisk Ave., Avalon, Pa. Recommended by J. D. Conway.

O'Donnell, W. P., Gang Foreman, Penna. System, 514 Second Ave., Derry, Pa. Recommended by C. B. Gray.

Perrott, J. C., Asst. Supt. Labor and Wage Bureau, Penna. System, Pittsburgh, Pa. Recommended by J. D. Conway.

Redding, P. E., Salesman, Johns-Manville, Inc., Cleveland, Ohio. Recommended by D. J. Redding.

Sutherland, Lloyd, Gen. Storekeeper, P. & L. E. R. R., 227 Radcliffe St., Pittsburgh, Pa. Recommended by J. D. Conway.

Watson, A. C., Supt., Penn. System, 1003 Penn Ave., Pittsburgh, Pa. Recommended by T. M. Blakley.

PRESIDENT: As soon as these applications have been approved by the Executive Committee, the gentlemen will become members upon payment of the year's dues.

As this is the Annual Meeting, the next order of business is the presentation of the Annual Reports of the Secretary and the Treasurer. We will first hear the report of the Secretary.

SECRETARY'S REPORT

Pittsburgh, Pa., October 25, 1923.

To the Officers and Members of
The Railway Club of Pittsburgh.

Gentlemen:

The following is a summary of membership and financial statement for the fiscal year ended October 25, 1923.

MEMBERSHIP

Reported last year	1,154	
Received into membership during the year	108	
Reinstated	24	
		1,286
Suspended, non-payment of dues	139	
Resigned	41	
Loss of address	16	
Died	15	
		211
Present membership		1,075

Of the above membership five are honorary. They are D. C. Buell, Samuel O. Dunn, Julian Kennedy, Rev. Samuel McCauley Lindsay and John A. Penton.

NAMES OF DECEASED MEMBERS

The following deaths were reported during the year 1922-1923: W. Gibson Bird, Wm. E. Brumble, James F. Christley, B. S. Hammill, Edward L. Harney, George F. Harris, Scott R. Hayes, H. H. Hunter, L. P. Lincoln, W. K. Steele, C. F. Thiele, W. H. Thomas, J. F. Townsend, A. M. West and J. B. Yohe, Jr.

FINANCIAL

Receipts

In hands of Treasurer at close of last year	$4,711.09	
From dues	3,129.00	
From advertisements	1,854.60	
From sale of tickets, Smoker Oct. 26, 1922	300.00	
Cash collected for dinner, Oct. 26, 1922	162.00	
From sale of Official Proceedings	17.50	
From incidentals	31.00	
From interest, Liberty Bonds and Bank Balance	153.87	
		$10,359.06

Disbursements

Printing Proceedings, notices, mailing, etc	$2,471.37	
Hall, luncheon, cigars, etc., for meetings	721.58	
Reporting proceedings of meetings	180.00	
Luncheon, entertainment, etc., Smoker, Oct. 26, 1922	756.60	
Messenger service and affidavits	20.00	
Moving Pictures	60.00	
Premium on bond, Treasurer and Secretary	17.50	
Salary of Secretary and advertising expenses	785.46	
		$ 5,012.51
Net balance		$ 5,346.55

Cash is made up of $2,346.55 and $3,000.00 in Liberty Bonds.

J. D. CONWAY, Secretary.

Approved: L. H. TURNER, Chairman.

D. J. REDDING
F. R. McFEATTERS
A. G. MITCHELL
F. M. McNULTY
J. G. CODE

D. M. HOWE
J. A. SPIELMANN
H. H. MAXFIELD
FRANK J. LANAHAN
SAMUEL LYNN

Executive Committee

Upon motion the report was accepted and directed to be inserted in the minutes of the meeting.

PRESIDENT: Next we will hear the report of the Treasurer.

TREASURER'S REPORT

Pittsburgh, Pa., October 25th, 1923.

To the Officers and Members of
The Railway Club of Pittsburgh.

Gentlemen:

I herewith submit Treasurer's report for year ended October 25th, 1923:

ON HAND AND RECEIPTS

On hand October 27th, 1921, including three $1,000.00 Liberty Bonds	$4,711.09	
Received from Secretary during year	5,494.10	
Interest on Bonds and Bank Balance	153.87	
Total		$10,359.06

DISBURSEMENTS

Paid on Secretary's Vouchers, 427 to 459 inclusive	5,012.51
Balance October 25th, 1923	$5,346.55

RESOURCES

Three Liberty Bonds, $1,000.00 each	$3,000.00	
Cash in bank	2,346.55	
Total		$5,346.55

F. H. STARK, Treasurer.

Approved: L. H. TURNER, Chairman.
D. J. REDDING
F. R. McFEATTERS
A. G. MITCHELL
F. M. McNULTY
J. G. CODE
D. M. HOWE
J. A. SPIELMANN
H. H. MAXFIELD
FRANK J. LANAHAN
SAMUEL LYNN
Executive Committee.

Upon motion the report was accepted and directed to be inserted in the minutes of the meeting.

We have audited the accounts of the Secretary and Treasurer and find them correct as above shown.

E. C. SATTLEY, Chairman;
G. W. WILDIN,
C .O. DAMBACH,
E. J. SEARLES,
Members Finance Committee.

PRESIDENT: Next in order is the report of the election of Officers from the Tellers.

The report of the Tellers of Election was read as follows:

TELLERS' REPORT

PRESIDENT—George D. Ogden.

FIRST VICE PRESIDENT—A Stucki.

SECOND VICE PRESIDENT—E. V. Williams.

TREASURER—F. H. STARK.

SECRETARY—J. D. Conway.

EXECUTIVE COMMITTEE—L. H. Turner, Chairman; D. J. Redding, F. R. McFeatters, A. G. Mitchell, F. M. McNulty, J. G. Code, D. M. Howe, J. A. Spielmann, H. H. Maxfield, Frank J. Lanahan, Samuel Lynn, D. F. Crawford.

FINANCE COMMITTEE—E. C. Sattley, Chairman; C. O. Dambach, E. A. Johnson, E. J. Searles, George W. Wildin.

RECEPTION COMMITTEE—F. H. Freshwater, Chairman; W. E. Fowler, Jr., J. E. Haynes, J. L. Smith, S. E. Van Vranken, H. M. Wolf

MEMBERSHIP COMMITTEE—J. A. Ralston, Chairman; H. E. Chilcoat, A. D. Chittenden, J. L. Cunningham, E. J. Devans, Harry B. Kelly, F. G. Minnick.

ENTERTAINMENT COMMITTEE—E. Emery, Chairman; Henry F. Gilg, Joseph H. Kummer.

SUBJECT COMMITTEE—John F. Lent, Chairman; E. B. DeVilbiss, William J. Knox, Charles Orchard, John B. Wright.

Upon motion, duly seconded and carried, the election was made unanimous.

PRESIDENT: It would be my pleasure at this time to present to you the Second Vice-President elect, Mr. Williams, but as he is unfortunately compelled to be absent from the city, we will have to forego that pleasure, and I will ask the First Vice-President, Mr. A. Stucki, to present himself to you.

MR. A. STUCKI: Fellow members of The Railway Club of Pittsburgh, it certainly gives me great pleasure to have the honor of being elected as your Vice President, and I can assure you that my aim always will be to justify your confidence. Not so long ago one of the members (in strictest confidence, it was Mr. Rauschart) wrote me and complimented me for being the first member of the Club who was able to get on the payroll twice the same year. He is right in one way, although the salaries were very nominal. But when the question of work done is considered, I am afraid I did not do enough to fill one job.

As Chairman of the Membership Committee, I have to apologize right here. My time was taken up so entirely with what I should have done as Vice President that I was not able to give it the attention it deserved. But there are some very excellent men on the Committee, such as Mr. John Ralston, Mr. Cunningham and many others, and those men worked hard to keep things moving in the right direction. But here is Mr. Conway coming in with a large list of members that he cut off. He is dropping them as fast as we can put them in. ..However, the Membership Committee did wonderful work, and I take this occasion to thank them for what they have accomplished.

As to my second job, that of Second Vice President, my intentions were also good, but my time was so taken up with what I should have done as Chairman of the Membership Committee that I completely failed to do anything. Even at that I may have accomplished about as much as any two Vice Presidents ever did.

Now coming down to the question of ordinary membership, I just want to say that I enjoyed it for twenty-two years, and I enjoyed every inch of it. By the way, I am a charter member. This is the Club where I made my first public remarks. At that time I could not think and talk at the same time. I had to think it out first and say it afterwards. I mention this to encourage the younger members to participate more freely in the discussions. It is more important than we as a rule realize. In the year 1915 I was asked by the International Engineering Congress of the Panama Exposition to read the paper on Rolling Stock for the United States and Canada, which I did, and was asked to preside over the Railway Section. I could not have done this had it not been for the training I had here in The Railway Club of Pittsburgh.

As said in the beginning, I consider it a great honor to be your Vice-President, and I shall never shirk responsibility. But, of course, each member has to help along. It is our Club, not mine, and with this spirit, I am sure, we will move onward just as in the past. I thank you.

PRESIDENT: I now, with great pleasure, introduce to you your new President, Mr. George D. Ogden.

MR. GEORGE D. OGDEN: Mr. Crawford, retiring President, and fellow members of The Railway Club of Pittsburgh:— I cannot tell you what a pride it is to receive this honor at your hands. I was refreshing my recollection tonight with Mr. Conway, and it is about twenty years since, when I was located at Altoona, I first became a member of this Club. I was attracted to the Club by a copy of the Proceedings that reached me. I found those Proceedings intensely interesting and I inquired how I could become a member of the Club. Later on, in 1903, I came to Pittsburgh and then I had the pleasure of attending your meetings. As a comparatively young man—and I say this in all sincerity, in the hope that it may tend to greater inspiration to the young men here—little did I dream that I would live to have the honor that has been bestowed upon me tonight. I think it is an aspiration that is well worth while to all young men. I was glad to hear Mr. Stucki speak of the training you get here. I think we should enter into the discussion freely.

I think also that Pittsburgh has the opportunity to make this Club the greatest Railway Club in the country. We have a great Railway Club in New York. Perhaps some of you have attended its meetings and its annual functions. There is a great Railway Club in Chicago. There are other great railway clubs. But I believe Pittsburgh has the opportunity to make this the banner Club, the largest and most successful Club of the country.

I have thought that perhaps it might be well to review briefly the success of this Oganization.

The Railway Club of Pittsburgh has just passed its twenty-second birthday, and is today in sound and flourishing condition. It was organized on October 18, 1901, at a meeting held in this city at the Hotel Lincoln. Its inception was largely the work of four men of foresight and determination. They were J. H. McConnell, of Pittsburgh, Manager of the American Locomotive Company; D. F. Crawford, of Fort Wayne, Ind., Superintendent Motive Power of the Pennsylvania Lines West; L. H. Turner, of Pittsburgh, Superintendent Motive Power of the Pittsburgh & Lake Erie Railroad, and J. D. McIlwain, of Pittsburgh, Railway Supplies.

The organization meeting was called to order by Mr. McIlwain, after which the Club's first officers were elected. Mr. McConnell was chosen President, Mr. Turner, Vice President; Mr. J. D. Conway, Secretary, and Mr. McIlwain, Treasurer. An Executive Committee was elected, consisting of Mr. Crawford, Mr. J. E. Simons and Mr. Frank T. Hyndman. A committee to draw up a constitution and by-laws was chosen,consisting of Mr. Conway, Mr. H. W. Watts and Mr. McConnell. At this meeting the present name of the Club was proposed and formally adopted.

Forty-nine names were presented to the organization meeting for membership. It was decided, however, to leave the charter open until the next meeting, which was held November 15, 1901, also at the Hotel Lincoln. On that occasion a total of 201 names were entered upon the roll of charter members.

Of the four original promoters, Messrs. McConnell and McIlwain have been called to their reward. Messrs. Crawford and Turner are still with us, and are today among the most active and energetic members of the Club. Mr. Crawford, who has left the field of railroad operation for that of railroad equipment, has served both as Vice President and President, in addition to holding numerous other official positions in the Club. He closes today his year as chief executive.

Our Club has had altogether fifteen Presidents, including the retiring Chief. All of these are living and retain their membership, with the exception of Messrs. J. H. McConnell and H. W. Watts.

Our membership at present is approximately 1,100, and it is a matter of pride to all of us that our rolls embrace so many men who are representative of leadership and progress in their respective fields. Through continuous and healthy gains in strength and numbers during the years, our Club has come to be universally recognized as one of the most important of the energizing and vitalizing factors in the industrial and transportation activities of Pittsburgh and the Pittsburgh district. Indeed, its influence is felt far beyond the confines of our own particular territory, a natural result of the fact that leadership of any form in the Pittsburgh district carries with it weight and influence of nation-wide scope. Our membership even extends to foreign countries, and our official proceedings, which are distributed monthly to members, are also made available to the general public through the principal libraries of the United States.

Another source of justifiable pride to our entire membership is the high character of the papers read at our meetings, and the accompanying discussions. Many of these have aroused interest throughout the country. In fact, on more than one occasion our Club has been the medium chosen by men of prominence to give public thought to new subjects of national importance.

The objects of the Club are stated in its by-laws to be: "Mutual intercourse for the acquirement of knowledge, by reports and discussion, for the improvement of railway operation, construction, maintenance and equipment, and to bring into closer relationship men employed in railway work and kindred interests." These purposes have guided our proceedings and affairs at all times, and all who are familiar with the

Club's activities realize that our organization has long been an agency of genuine force in furthering these constructive and helpful purposes.

Older members will recall that when the formation of the Club was first discussed, there were many who doubted whether it would be a permanent success. Indeed, open predictions were made—some of them by men thought to be well versed in railroad affairs—that the project would break down, as had happened with previous attempts to form a similar association. Happily, however, the men who organized this club banished from their minds all thought of failure before they took up the work. The fruit of their courage and determination is the strength and prestige which we enjoy today, and of which we are all so justly proud.

To be president of this organization is an honor which is keenly and deeply appreciated by one who has spent his working life in the railroad service and who cherishes the firm conviction that transportation is the Nation's first and most fundamental industry.

PRESIDENT: Before handing over the reins of authority to my successor, I wish to thank all the members of the Club for their hearty support and co-operation during the year we have just gone through. We have had a varied programme of papers, touching on several phases of transportation and things related thereto. I have but one thought for the Club, and that is that it should take up the problems of every department of the railroad and kindred interests and not confine itself to any one department. With that thought in mind, our papers throughout the year have been distributed so as to cover the various departments as far as possible.

I also wish to express my thanks to the Officers who have so loyally supported me and whose faithful work on your behalf, as well as mine, has contributed so much to the success of the year. I am proud of the fact that I have had the most cordial support from every member of the official staff. I wish particularly to refer to the splendid work of your Secretary. You may be proud of having such an efficient and capable Secretary as Mr. Conway, and I wish publicly to express my thanks to him. I assure you that I have enjoyed the pleasure and have considered it an honor to have served you and I ask for my successor the same kind, the same loyal and the same thoughtful and considerate support that you have given me.

PRESIDENT OGDEN: Owing to the untimely passing of a great railroad man, Colonel James A. McCrea, who came of a great railroad family, his distinguished father having been President of the Pennsylvania Railroad, there have been brought about in our official organization changes which will transfer some of the officers, including myself, to other jurisdictions. It is therefore fitting, it seems to me, that I should make mention of this fact to say that I very humbly and very respecfully place my case, with respect to tenure of office as President, in the hands of your Executive Committee. Perhaps some member of our Executive Committee may have something to say before we turn the meeting over to the Entertainment Committee. We look to our Executive Committee for guidance and it is perfectly proper that we should expect to get some pearls of wisdom from them on such an occasion. Mr. Lanahan, have you anything to say at this time?

MR. FRANK J. LANAHAN: Mr. President and Members of the Railway Club—The situation of which Mr. Ogden has just spoken, I think, does not require any action on the part of the Executive Committee. Your votes have unanimously elected him to his exalted office, and as far as my voice in the Executive Committee goes, he remains President of the Railway Club of Pittsburgh. After listening to such a scholarly and instructive address, embodying the history of the Club, it is quite evident that we have made a wise choice.

Mr. Ogden spoke of our membership. There is one phase of this that to me will ever be an attractive one in our Club, and that is its spirit of true democracy, where operating executive and the mechanical man meet, elbows are rubbed by boss and artisan and side by side sit employer and employee, while the horny handed son of toil is on an equality with the president and both enjoy the same footing and have equal privilege of membership. Anyone interested in transportation or affiliated interests is eligible for membership. The dues are but Three Dollars a year and for that modest sum, one has the opportunity of attending the nine monthly meetings and listening to the entertaining and instructive papers on a wide range of educational and absorbing subjects. After each meeting is served a lunch of limitless culinary products, appealing to the appreciative appetites of even the most pronounced epicure. Then, too, to each member is sent a copy of the "Monthly Proceedings," affording an opportunity of filing for reference the subjects covered by recognized authorities at the different meetings. For good fellowship the Club is a marvel and the enjoyment derived from the contact it affords, is well typified by the number who never miss a single meeting. An invitation is most cordially extended to you here tonight who do not belong, to become enrolled in an organization that will welcome you into the ranks of good fellowship, where you, too, can help develop and advance the ideas of education and democracy.

There are two very human attributes of the Railway Club on which I desire to touch; one Mr. Crawford makes mention of in his swan-song, Loyalty, the other, is my theme of the evening, Appreciation. Our President has given to us loyalty in his splendid service and the results are well tested by the condition of the Club at the present time. The attendance at this meeting tells better than any oratorical superlatives that any speaker could use, how our membership feels towards our retiring President. Faithfully and efficiently has he performed the duties entrusted to him and as a testimonial of the happy days he has spent in our midst, we have prepared a little memento of the occasion. It has been baptized with a very scientific name, "Metallurgical Microscope."

with

Photographic and Illuminating Attachment.

In other words, it is a microscope attached to a photographic apparatus that magnified to such an extent as will enable him to carry out his fancies in a scientific line. The thought occurred to me when first I beheld this marvelous piece of mechanism, that just possibly it would magnify the net earnings of railroads so that they will really exist when wages are increased and freight rates reduced.

Magnify in the railway supply line orders so that the poverty-stricken recipient may feel he has been saved from ruin.

Possibly our retiring President can make a discovery of a microbe bacteria or the ingredient that can be put into a quantity of distilled water that will have the effect of making the efficient Chairman of our Reception Committee, at all times remember the lines of "Gunga Din."

Drawing upon his medical skill, with the use of this magnifying apparatus, a cure may be found for the (unique) position of our new Vice President.

Possibly he could magnify some space in downtown Pittsburgh during the day, where Dave Redding, at least, would think he could park his automobile. Then again, discovery may be made of how our financial wizard of a secretary, makes the Three Dollars dues of the Railway Club cover all the expenses of the meetings, including the elaborate lunch which we all enjoy.

These are but a few of the experiments that our retiring President can carry on at his leisure and at a later date, give the members an opportunity of being acquainted with his scientific research.

Your Committee delegated with the responsibility of procuring a souvenir for our retiring President, felt that in presenting this magnifying camera for the scientific attainments of Mr. Crawford, that the engrossing work of the camera would consume considerable of the waking hours of the recipient and consequently his dear wife would be robbed of much of his appreciated company, so to appease her righteous wrath, there has been included. this bronze clock and accompanying candlesticks. The time-piece has the ship bell attachment and, I think, chimes very sweetly. It is the hope of the Club, expressed through me, as the medium of the Committee, that the sound of these bells will ever fill your ears, Mr. Crawford with the gratitude of your fellow-members for what you have done for us, and as you draw closer to the Western horizon of your natural life and reach the time when your books are even more companionable than they are today; when the carpet slippers and the easy chair and the fireside will become more attractive to you, then in memory you will think back to this night, this Club and the faces of all your friends, and let them to the end of time bear the message of affection from one and all of the Railway Club of Pittsburgh.

RETIRING PRESIDENT CRAWFORD: Mr. Lanahan and fellow members of The Railway Club of Pittsburgh:—I assure you that Mr. Lanahan's remarks of appreciation find a ready response in my heart. I shall cherish and treasure the things you have been good enough to select for me and I trust that I shall have many opportunities to use the microscope and find at least some of the things Mr. Lanahan mentioned. I have no doubt that many times when I am using it the lady for whom the clock seems to have been selected will tell me what time it is and intimate something about retiring. The carpet slipper age is already here. I enjoy the books and I enjoy the carpet slippers. And I shall watch the clock and listen to its chimes. I am particularly glad to have a clock that chimes the ship's bells, because it will make me think that maybe sometime I shall have a trip to Europe. I assure you I thank you very much indeed.

PRESIDENT OGDEN: I am sure we all get as much pleasure out of giving this as Mr. Crawford does in receiving it.

I am new in this position, but I believe that now is the time—and Mr. Conway will correct me if I am wrong—when the meeting should be turned over to the Entertainment Committee. Mr. Emery will now take charge. I thank you all very much.

A very brilliant and enjoyable programme of entertainment followed, after which a buffet lunch was served.

J. D. CONWAY, Secretary.

CONSTITUTION

ARTICLE I.

The name of this organization shall be "THE RAILWAY CLUB OF PITTSBURGH."

ARTICLE II.

OBJECTS

The objects of this Club shall be mutual intercourse for the acquirement of knowledge, by reports and discussion, for the improvement of railway operation, construction, maintenance and equipment, and to bring into closer relationship men employed in railway work and kindred interests.

ARTICLE III

MEMBERSHIP

SECTION, 1. The membership of this Club shall consist of of persons interested in any department of railway service or kindred interests, or persons recommended by the Executive Committee upon the payment of the annual dues for the current year.

SEC. 2. Persons may become honorary members of this Club by a unanimous vote of all members present at any of its regular meetings, and shall be entitled to all the privileges of membership and not be subject to the payment of dues or assessments.

ARTICLE IV.

OFFICERS

The officers of this club shall consist of a President, First Vice-President, Second Vice-President, Secretary, Treasurer, Finance Committee consisting of five members, Membership Committee consisting of seven members, Entertainment Committee consisting of three members, Reception Committee consisting of six members, Subject Committee consisting of five members, and an Elective Executive Committee of three or more members, who shall serve a term of one year from the date of their election, unless a vacancy occurs, in which case a successor shall be elected to fill the unexpired term.

ARTICLE V.

DUTIES OF OFFICERS

SECTION 1. The President shall preside at all regular or special meetings of the Club and perform all duties pertaining to a presiding officer; also serve as a member of the Executive Committee.

SEC. 2. The First Vice-President, in the absence of the President, will perform all the duties of that officer; the Second Vice-President, in the absence of the President and First Vice-President, will perform the duties of the presiding officer. The First and Second Vice-President shall also serve as members of the Executive Board.

SEC. 3. The Secretary will attend all meetings of the Club or Executive Committee, keep full minutes of their proceedings, preserve the records and documents of the Club, accept and turn over all moneys received to the Treasurer at least once a month, draw cheques for all bills presented when approved by a majority of the Executive Committee present at any meetings of the Club, or Executive Committee meeting. He shall have charge of the publication of the Club Proceedings and perform other routine work pertaining to the business affairs of the Club under the direction of the Executive Committee.

SEC. 4. The Treasurer shall receipt for all moneys received from the Secretary, and deposit the same in the name of the Club within thirty days in a bank approved by the Executive Committee. All disbursements of the funds of the Club shall be by cheque signed by the Secretary and Treasurer.

SEC. 5. The Executive Committee will exercise a general supervision over the affairs of the Club and authorize all expenditures of its funds. The elective members of this Committee shall also perform the duties of an auditing committee to audit the accounts of the Club at the close of a term or at any time necessary to do so.

SEC. 6. The Finance Committee will have general supervision over the finances of the Club, and perform such duties as may be assigned them by the President or First and Second Vice-Presidents.

SEC. 7. The Membership Committee will perform such duties as may be assigned them by the President or First and Second Vice-Presidents, and such other duties as may be proper for such a committee.

SEC. 8. The Entertainment Committee wil perform such duties as may be assigned them by the President or First and Second Vice-Presidents, and such other duties as may be proper for such a committee.

ARTICLE VI.

ELECTION OF OFFICERS

SECTION 1. The officers shall be elected at the regular annual meeting as follows, except as otherwise provided for:

SEC. 2. Printed forms will be mailed to all the members of the Club, not less than twenty days previous to the annual meeting, by the elective members of the Executive Committee. These forms shall provide a method, so that each member may express his choice for the several offices to be filled.

SEC. 3. The elective members of the Executive Committee will present to the President the names of the members receiving the highest number of votes for each office, together with the number of votes received.

SEC. 4. The President will announce the result of the ballot and declare the election.

SEC. 5. Should two or more members receive the same number of votes, it shall be decided by a vote of the members present, by ballot.

ARTICLE VII.

AMENDMENTS

Amendments may be made to this Constitution by written request of ten members, presented at a regular meeting and decided by a two-thirds vote of the members present at the next regular meeting.

BY-LAWS

ARTICLE I

MEETINGS

SECTION 1. The regular meetings of the Club shall be held at Pittsburgh, Pa., on the fourth Thursday of each month, except June, July and August, at 8 o'clock p. m.

SEC. 2. The annual meeting shall be held on the fourth Thursday of October each year.

SEC. 3. The President may, at such times as he deems expedient, or upon request of a quorum, call special meetings.

ARTICLE II.

QUORUM

At any regular or special meeting nine members shall constitute a quorum.

ARTICLE III.

DUES

SECTION 1. The annual dues of members shall be Two Dollars, payable in advance on or before the fourth Thursday of September each year.

SEC. 2. The annual subscription to the printed Proceedings of the Club shall be at the published price of One Dollar. Each member of the Club shall pay for both dues and subscription. Dues and subscription paid by members proposed at the meetings in September or October shall be credited for the following fiscal year.

SEC. 3. At the annual meeting members whose dues and subscription are unpaid shall be dropped from the roll after due notice mailed them at least thirty days previous.

SEC. 4. Members suspended for non-payment of dues shall not be reinstated until all arrearages have been paid.

ARTICLE IV.

ORDER OF BUSINESS

1—Roll call.

2—Reading of the minutes.

3—Announcements of new members.
4—Reports of Committees.
5—Communications, notices, etc.
6—Unfinished business.
7—New Business.
8—Recess.
9—Discussion of subjects presented at previous meeting.
10—Appointment of committees.
11—Election of officers.
12—Announcements.
13—Financial reports or statements.
14—Adjournment.

ARTICLE V.

SUBJECTS—PUBLICATIONS

SECTION 1. The Subject Committee will provide the papers or matter for discusion at each regular meeting.

SEC. 2. The proceedings or such portion as the Executive Committee may approve shall be published (standard size, 6x9 inches) and mailed to the members of the Club or other similar clubs with which exchange is made.

ARTICLE VI.

The stenographic report of the meetings will be confined to resolutions, motions and discussions of papers unless otherwise directed by the presiding officer.

ARTICLE VII.

AMENDMENTS

These By-Laws may be amended by written request of ten members, presented at a regular meeting, and a two-thirds vote of the members present at the next meeting.

MEMBERS

Abel, A. W.,
Stationery Storekeeper,
Penna. System.
7722 Brashear St.,
Pittsburgh, Pa.

Adair, Harvey C.,
Gang Fore., Penna. System,
4933 Breesport St.,
Pittsburgh, Pa.

Adams, Clifford M.,
Asst. Storekeeper, Penna,
System,
908 Center St.,
Wilkinsburg, Pa.

Adams, Frank T.,
Rwy. Salesman,
The Patterson-Sargent Co.,
202 Fitzsimmons Bldg.,
Pittsburgh, Pa.

Adams, Lewis,
Clerk, P. S. C. Co.,
4004 Northminster Ave.,
N. S., Pittsburgh, Pa.

Adams, Walter A.,
Clerk, P. & L. E. R. R.,
720 Vermont Ave.,
Glassport, Pa.

Africa, John H.,
Asst. Fore. Mach.,
Penna. System,
316 Second St.,
Pitcairn, Pa.

A'Hearn, Frank M.,
Asst. Gen. Fore., B.&L.E.RR
7 No. Wood St.,
Greenville, Pa.

Aiken, Glen A.,
Vice President,
American Nut and Bolt
Fastener Co.,
3 Ontario St.,
Pittsburgh, Pa.

Ainsworth, J. H.,
R. R. Sales Dept.,
A. M. Byers Co.,
410 Union Bank Bldg.,
Pittsburgh, Pa.

Akins, A. P.,
Gang Foreman,
Penna. System,
Derry, Pa.

Alexander, J. R.,
203 Virginia Ave.,
Aspinwall Pa.

Allan, W. J.,
Sec. and Treas., Commissary
Co. of America,
1665 New Haven Ave.,
South Hills Branch
Pittsburgh, Pa.

Allderdice, Norman,
Sales Mgr., Manning Maxwell & Moore,
1005 Park Bldg.,
Pittsburgh, Pa.

Alleman, C. W.,
139 Merrimac St.,
Mt. Washington,
Pittsburgh, Pa.

Allen, G. F.,
Trav. Frt. & Psgr. Agt.,
Union Pacific R. R.,
4128 Jenkins Arcade,
Pittsburgh, Pa.

Allen, Jas. P.,
President,
Union Steel Casting Co.,
62nd and Butler Sts.,
Pittsburgh, Pa

Allison, John, Chf. Engr.,
Pgh. Steel Foundry Co.,
Box 228,
Pittsburgh, Pa

Altman, C. M.,
Asst. Gen Fore.,
Frt Car Insp'rs.,
Penna. System,
Pitcairn Shop,
Pitcairn, Pa

Altmeyer Harry,
Trav. Car Inspr.,
P. & L. E. R. R.,
R. F. D. No. 4, Box 82,
Beaver Falls, Pa

Ambrose, W. F.,
M. M., Aliquippa & So. R. R.,
314 Larimer Ave.,
Woodlawn, Pa.

Anderson, A. E.,
President and Counsel,
Pgh. Dist. R. R. Co.,
1018 Bessemer Bldg.,
Pittsburgh, Pa.

Anderson, Donald P.,
Lead Clerk, Penna. System,
7209 Mt. Vernon St.,
Pittsburgh, Pa

Anderson, G. S.,
Div. Electrician,
Penna. System,
Box 19, Penna. Station,
Pittsburgh, Pa.

Anderson, James W.,
Mgr. of Pneu. Tool Sales,
Ingersoll Rand Co.,
706 Cham of Com. Bldg.,
Pittsburgh, Pa.

Anger, C. E.,
Upholster, P. & L. E. R. R.,
15 Richey Ave.,
N. S., Pittsburgh, Pa.

Antes, Edwin L.,
Foreman Elect. Dept.,
Pressed Steel Car Co.,
11 Frazier Ave.,
McKees Rocks, Pa.

Anthony, J. T.,
Vice President,
American Arch Co.,
17 E 42nd St.,
New York, N. Y.

Arensberg, F. L.,
President,
Vesuvius Crucible Co.,
Box 47,
Swissvale, Pa.

Armstrong, J. B.,
Brown Co., Inc.,
26 Tenth St.,
Pittsburgh, Pa.

Ashcraft, E. J.,
Asst. Enginehouse Foreman,
Penna. System,
Derry, Pa.

Atterbury, W. W.,
V. P., P. R. R. Co.,
Broad St. Sta.,
Philadelphia, Pa.

Ault, D. V.,
Pres., Silumite Prod. Corp.,
500 Morris Bldg.,
Philadelphia, Pa.

Austin, Francis,
Gen. Sales Mgr.,
R .R. Service Div.,
Carbon-Oxygen Co.,
Benedum Trees Bldg.,
Pittsburgh, Pa.

Ayers, H. B.,
Gen. Mgr., H. K. Porter Co.,
49th St. and A. V. Ry.,
Pittsburgh, Pa.

Babcock, F. H.,
Safety Agent,
P. & L. E. R. R.,
415 House Bldg.,
Pittsburgh, Pa.

Bachman, E. L.,
Asst. M. M., Penna. System,
2849 Chartiers Ave.,
Corliss Sta.,
Pittsburgh, Pa.

Bacon, John L.,
Service Mgr.,
Franklin Rwy. Supply Co.
17 E. 42nd St.,
New York City

Baer, Harry L.,
Pres. Sterling Equip't. &
Supply Co.,
220 Stanwix St.,
Pittsburgh, Pa.

Bagnall, R. V.,
Chief Train Disp'r.,
B. & L. E. R. R.,
Greenville, Pa.

Bailey, F. G.,
Chief Draftsman,
Motor Truck Dept.,
Standard Steel Car Co.,
Butler, Pa.

Bailey, John M.,
V. P., Standard Inspection
Company,
954 Century Bldg.,
Pittsburgh, Pa.

Baird, F. C.,
Traffic Mgr., B. & L. E. R. R.,
Box 456,
Pittsburgh, Pa.

Bakewell, Donald C.
President, Duquesne Steel
Foundry Company
Farmers Bank Bldg.,
Pittsburgh, Pa.

Balderoni, Albert J.,
Contractor,
35 Donner Ave.,
Monessen, Pa.

Baldwin, A. V.,
C. C. to M. M.,
Penna. System,
2300 Wilson Ave.,
N. S., Pittsburgh, Pa.

Baldwin, S. Y.,
Gen. Agt.,
Del. & Hudson Co.,
Bessemer Bldg.,
Pittsburgh, Pa

Ball, Geo. L.,
Sec'y & Treasurer,
Ball Chemical Co.,
230 S. Fairmont Ave.,
Pittsburgh, Pa.

Bandi, John,
Bill Clk., P. C. & Y. R. R.,
1115 Criss St.,
Pittsburgh, Pa.

Bandish, Jos. M.,
care Universal Packing Corp.
South Bank,
Overbrook Borough, Pa.

Barclay, J. G.,
Salesm'n, Garratt-Callahan Co.,
2328 W. Delaware St.,
Indianapolis, Ind.

Barnes, H. J.,
Car Dist'r., Conemaugh Div.,
Penna. System,
Springdale, Pa.

Barnett, Geo.,
Special Representative,
W. W. Lawrence & Co.,
Pittsburgh, Pa.

Barney, Harry,
Proprietor,
Laughlin—
Barney Machinery Co.,
483 Union Arcade
Pittsburgh, Pa.

Barnhart, F. L.,
Secretary,
Union Collieries Co.,
410 Union Arcade,
Pittsburgh, Pa.

Barratt, R. D.,
Car Inspector,
Monongahela R. R. Co.,
1513 Sheridan Ave.,
S. Brownsville, Pa.

Barrett, R. L.,
T. M., P. & W. Va. Ry.,
Wabash Bldg.,
Pittsburgh, Pa.

Bartholomew, W. S.,
Pres't., Loco. Stoker Co.,
Robinson & Darrah Sts.,
Pittsburgh, Pa.

Basford, G. M.,
Pres., G. M. Basford Co.,
17 East 42nd St.,
New York, N. Y.

Batchelar, E. C.,
Manager, The Motsch &
Merryweather Mach'y Co.,
130 Seventh St.,
Pittsburgh, Pa.

Bateman, W. H. S.,
Sales Agent,
Parkersburg Iron Co.,
822 Commercial
Trust Building,
Philadelphia, Pa.

Battenhouse, John M.,
Chiropractor,
214 Westinghouse Ave.,
Wilmerding, Pa.

Batty, John,
Boiler Inspector,
Fidelity and Casualty Co.,
11 Buffalo St.,
Oakland, Pittsburgh, Pa.

Beach, Howard L.,
Engineer,
929 Union Trust Bldg.,
Pittsburgh, Pa.

Beals, Robert E.,
Engineer, Union R. R. Co.,
240 W. Swissvale Ave.,
Swissvale, Pa.

Beam, E. J.,
Car Builder, Penna. System,
577 Fourth St.,
Pitcairn, Pa.

Beattie, J. A.,
General Superintendent,
McKeesport Con. R. R.,
Frick Building,
Pittsburgh, Pa.

Beegel, F. W.,
Chief Clerk,
Union Steel Casting Co.,
62nd and Butler Sts.,
Pittsburgh, Pa.

Beers, W. E.,
Sheet Metal Worker,
P. & L. E. R. R.,
P. O. Box No. 8,
Dawson, Pa.

Beltz, John D.,
Supt., B. & O. R. R.,
133 Sycamore St.,
Mt. Washington,
Pittsburgh, Pa.

Bennett, Robert George,
Superintendent M. P.,
P. R. R. Co.,
Williamsport, Pa.

Berg, Karl,
Shop Supt., P. & L. E. R. R.,
6319 Morrowfield Ave.,
Pittsburgh, Pa.

Berghane, A. L.,
Mechanical Expert,
Westinghouse Air Brake Co.,
Wilmerding, Pa.

Berlin, Ralph Q.,
C. C. Trans. Dept.,
Carnegie Steel Works,
Braddock, Pa.

Bernoulli, W. H.,
Acct., Pugh Bros. Jewelry Co.,
211 House Bldg.,
Pittsburgh, Pa.

Beswick, John,
Ass't. Road Foreman of
Engines, P. R. R. Co.,
1007 Mill St.,
Wilkinsburg, Pa.

Bigelow, Geo. R.,
Rep., Art Metal Const'n Co.,
315 Oliver Bldg.,
Pittsburgh, Pa.

Bihler, L. C.,
Traffic Manager,
Carnegie Steel Co.,
Room 814 Carnegie Bldg.
Pittsburgh, Pa.

Blackall, Robert H.,
611 Transit Bldg.,
No. 7 East 42nd St.,
New York, N. Y.

Blackmore, G. A.,
Vice President & Gen. Mgr.,
Union Switch & Signal Co.,
Swissvale, Pa.

Blair, Harry A.,
Supervisor Safety Appliances,
3077 Dellwood Ave.,
Dormont,
Pittsburgh, Pa.

Blakely, W. W.,
Asst. Gen. Freight Agent,
B. & O. R. R. Co.,
921 Oliver Building,
Pittsburgh, Pa.

Blakley, T. M.,
R. F. of E., Penna. R. R.,
101 Emerson Ave.,
Sharpsburg, Pa.

Blick, James, Jr.,
Srtuctural Draftsman,
% Car Engr's. Office,
Cambria Steel Co.,
Johnstown, Pa.

Boate, H. S.,
Asst. Foreman,
P. & L. E. R. R.,
438 Russelwood Ave.,
McKees Rocks, Pa.

Bond, W. W.,
Asst. Road Foreman of
Engines, P. R. R. Co.,
5447 Kincaid St.,
Pittsburgh, Pa.

Bonhoff, E. L.,
Fore., Penna. System,
429 Rosedale St.,
Wilkinsburg, Pa.

Booth, J. K.,
Master Mechanic,
B. & L. E. R. R.,
No. 8 Penn Ave.,
Greenville, Pa.

Borg, John Edw.,
Chief Draftsman,
Julian Kennedy,
232 Martsolf Ave.,
West View, Pa.

Bortz, Frank C.
Sales Manager,
Union Collieries Co.,
410 Union Arcade,
Pittsburgh, Pa.

Boss, Raymond E.,
Baggage Master, P. R. R.,
Box 131,
Elrama, Pa.

Bottomly, E. S.,
Chief Joint Inspector,
P. R. R., W. M., P. & R. Ry.
Martinsburg, W. Va.

Bowden, T. C.,
Coal Inspector,
B. & L. E. R. R.,
Greenville, Pa.

Bowery, Frank J.,
Checker, P. S. C. Co.,
214 Birmingham Ave.,
Avalon, Pa.

Boyer, Chas. E.,
General Car Inspector,
P. R. R. Co.,
202 Penna. Station,
Pittsburgh, Pa.

Boyer, Jay D.,
Mach., Verona Steel Cast. Co.,
500 Fifth St.,
Oakmont, Pa.

Bradley, Jas. A.,
The Bradley Co.,
1007 Jones Bldg.,
Pittsburgh, Pa.

Bradley, W. C.,
C. C. to Gen'l. Supt.,
Union R. R.,
1808 Lafayette St.,
Swissvale, Pa.

Brady, Daniel M.,
President, Brady Brass Co.,
90 West St.,
New York, N. Y.

Brady, H. K.,
Supt., Labor & Wage Bureau
Penna. System,
720 Penna. Station,
Pittsburgh, Pa.

Brandt, W. L.,
Gang Fore. P. R. R.,
147 Shields St.,
Rochester, Pa.

Brandon, Howard,
Engine House Foreman,
Montour Railroad,
Coraopolis, Pa.

Brann, W. S.,
Superintendent Coal Docks,
Union R. R.,
Duquesne, Pa.

Brant, Wm. J.,
1001 Bessemer Bldg.,
Pittsburgh, Pa.

Braun, Frederick R.,
Gang Fore., Penna. System,
132 Julius St.,
Pittsburgh, Pa.

Braun, J. F.,
Gang Fore., Penna. System,
526 Paulson Ave.,
Pittsburg, Pa.

Braun, Otto F.,
Foreman, Machine Shop,
P. & L. E. R. R.,
414 Russellwood Ave.,
McKees Rocks, Pa.

Brendlinger, M. T.,
Gang Fore.—Mach.,
Penna. System,
Lock Box 237,
Pitcairn, Pa.

Brewer, Geo. D.,
Chief Draftsman,
Penna. System,
437 Union St.,
Verona, Pa.

Brewster, Morris B.,
Pres. & Gen. Mgr.,
Morris B. Brewster, Inc.,
332 Michigan Ave.,
Chicago, Ill.

Briggs, Z. M.,
Assistant Engineer,
Penna. Lines West,
1115 Union Sta.,
Pittsburgh, Pa.

Brill, Bernard A.,
Stockman, Penna. System,
2122 East St.,
N. S., Pittsburgh, Pa.

Brooke, Willard,
Car Fore., Union R. R.,
R. F. D. No. 1,
Verona, Pa.

Brower, J. E.,
Master Mech., Penna System,
Conemaugh Div.,
Verona, Pa.

Brown, C. C.,
Rep., Dearborn Chemical Co.,
710 Farmers Bank Bldg.,
Pittsburgh, Pa

Brown, E. C.,
Chief Civil Engineer,
Carnegie Steel Co.,
Room 1012,
Carnegie Building,
Pittsburgh, Pa.

Brown, F. M.
Supt., P. & L. E. R. R. Co.,
Pittsburgh, Pa.

Brown, J. Alexander,
Vice President and Manager
The Railway Equipment
& Publication Co.,
424 W. 33rd St.,
New York, N. Y.

Brown, John T., Jr.,
Supt. Duquesne Reduction Co.
Gross and Yew Sts.,
Pittsburgh, Pa.

Brown, W. E.,
Asst. Chf. Engr., M. of W.,
Penna. System,
1114 Penna. Station
Pittsburgh, Pa

Browne, Bard,
Rep., The Superheater Co.,
17 E 42nd St.,
New York, N. Y.

Bruner, H. L...
C. C. to Engr., M. of W.,
Penna. System,
320 Penna. Station,
Pittsburgh, Pa.

Buckbee, W. A.,
The Superheater Co.,
Nyack, N. Y.

Buechner, W. A.,
District Manager,
E. F. Houghton & Co.,
907 Bessemer Bldg..
Pittsburgh, Pa.

Buell, D. C.,
Director, The R'wy. Educational Bureau,
1203 Farnam St.,
Omaha, Neb.

Buffington, W. P.,
Traffic Mgr.,
Pittsburgh Coal Co.,
P. O. Box 64,
Pittsburgh, Pa.

Burel, W. C.,
Master Mechanic,
Western Allegheny R. R.,
Kaylor, Pa.

Burk, Geo. C.,
Gang Fore., Penna. System,
Box 459,
Derry, Pa.

Burket, L. C.,
Res. Insp'r., Penna. System,
607 E. Harrison Ave.,
Altoona, Pa.

Burkholder, Geo. M.,
Supt., Mech. Dept.,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Burkholder, H. E.,
Gang Fore., Penna. System,
229 Locust St.,
Johnstown, Pa

Burnes, C. R.,
R. F. of Engines,
B. & O. R. R. Co.,
507 Green St.,
Connellsville, Pa.

Burns, Thomas F.,
Fore. Car Insp'rs.,
Penna. System,
600 Church St.,
Gallitzin, Pa.

Burnside, C. J.,
Fore., B. M., P. & W. Va. Ry.,
132 Grant Ave.,
Crafton, Pittsburgh, Pa.

Burrell, D. H.,
Gang Fore., Penna. System,
617 Sixth St.,
Pitcairn, Pa.

Burton, G. H.,
Gen. Fore., Penna. System,
South Pittsburgh Shop,
S. S. Pittsburgh, Pa.

Buser, Fred F.,
Mech. Engr., P. S. C. Co.,
6724 Thomas St.,
Pittsburgh, Pa.

Cady, P. C.,
Railway Supplies,
30 Church St., Room 506,
New York City

Cagney, Patrick F.,
Time Checker,
Corrado & Galiardi,
Glassport, Pa.

Caldwell, Chas. R.,
Chf. Delivery Clerk, Purch.
Dept., Penna. System,
706 Ridgevue Ave.,
Bellevue, Pa.

Caldwell, S. S.,
Gang Fore., Penna. System,
7141 Race St.,
Homewood, Pittsburgh, Pa.

Calvert, H. W.,
General Foreman,
P. & L. E. R. R.,
518 West Cherry St.,
Mahoningtown, Pa.

Campbell, Argyle,
President,
Enterprise Ry. Equip. Co.,
1153 Rookery Bldg.,
Chicago, Ill.

Campbell, Edward D.,
Ass't. Gen'l. Fr't Agt.,
B. & L. E. R. R.,
Union Arcade,
Pittsburgh, Pa.

Campbell, J. T.,
Ass't. Terminal Agent,
B. & O. R. R. Co.,
Grant and Water Sts.,
Pittsburgh, Pa

Candy, A. M.,
Gen'l. Eng'r., Westinghouse
Elec. & Mfg. Co.,
1121 Burns Ave.,
Wilkinsburg, Pa.

Carbis, N. J.,
The Fairbanks Co.,
113 Wood St.,
Homestead, Pa.

Cardwell, J. R.,
Pres., Union Draft Gear Co.,
332 S. Michigan Ave.,
Chicago, Ill

Carlsson, John,
Draftsman, Julian Kennedy,
225 Fingol St.,
Pittsburgh, Pa.

Carnahan, W. E.,
Director, Winfield R. R.,
2215 Oliver Bldg.,
Pittsburgh, Pa.

Carothers, Chas. G.,
Service Engr., Franklin Rwy.
Supply Co., Inc.,
17 East 42nd St.,
New York City.

Carpenter, H. D.,
M. P. Insp'r.,
Penna. System,
55 Cobb Ave.,
Crafton, Pa.

Carr, T. W.,
Ch'f. Draftsman, M. P. Dept.,
P. & L. E. R. R.,
Smithfield & Carson Sts.,
Pittsburgh, Pa.

Carroll, John P.,
Shop Clerk, Penna. System,
322 Princeton Place,
Pittsburgh, Pa.

Carson, John,
Supt. Equip't., Ft. Pitt
Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Carter, John D.,
Gen. Agt., Traffic Dept.,
Union Pacific System,
7026 Jenkins Arcade,
Pittsburgh, Pa.

Cartwright, Wm. E.,
Sales Mgr.,
Damascus Bronze Co.,
928 South Ave.,
N. S., Pittsburgh, Pa.

Case, Harvey F.,
Route Clk., Penna. System,
520 Sixth Ave.,
McKeesport, Pa.

Caton, S. W.,
Master Car Builder,
W. M. R. R.,
Hagerstown, Md.

Ceska, Geo. D.,
Mech. Engr., Whitman
& Barnes Mfg. Co.,
Box 648,
Pittsburgh, Pa.

Chaffin, H. B.,
M. M.,
Penna. Lines West,
Dennison, Ohio

Chalker, A. R.,
Chief Draftsman,
Locomotive Stoker Co.,
473 Dawson Ave.,
Bellevue, Pa.

Charlton, W.,
Fore. Car Insp'r.,
Monongahela R. R. Co.,
Second St.,
South Brownsville, Pa.

Cheesman, P. M.,
Master Mech., Penna. System,
Wheeling Div.,
Wheeling, W. Va.

Cherry, Jas. T.,
Roadmaster,
P. & W. Va. Ry.,
626 Grandview Ave.,
Carnegie, Pa.

Chilcoat, H. E.,
Manager, Clark Car Co.,
1619 Oliver Building,
Pittsburgh, Pa.

Chittenden, A. D.,
Supt. Transportation,
B. & L. E. R. R.,
727 Union Arcade,
Pittsburgh, Pa.

Chollman, E. L.,
V. P. & Sales Mgr.,
Paxton Mitchell Co.,
27th & Martha Sts.,
Omaha, Neb.

Christfield, J. G.,
Mechanical Engineer,
Forged Steel Wheel Co.,
Butler, Pa.

Christiansen, Wm.,
Dist. Service Rep.,
Worthington Pump and
Machinery Co.,
736 Hill Ave.,
Wilkinsburg, Pa.

Christianson, A.,
Chief Engineer,
Standard Steel Car Co.,
Butler, Pa.

Christy, F. X.,
Machinist,
P. R. R.,
227 Fisk St.,
Pittsburgh, Pa.

Church, C. C.,
Spec.. Agt., Pittsb'gh Coal Co.,
54 Hodgson Ave.,
Crafton Station,
Pittsburgh, Pa.

Church, C. R.,
M. M., Union R. R.,
319 Larimer Ave.,
Turtle Creek, Pa.

Clapper, H. O.,
Gang. Fore., Penna. System,
810 Penn Ave.,
Wilkinsburg, Pa.

Clark, C. C.,
Asst. Gen. Sales Agent,
Central Dist.,
Pressed Steel Car Co.,
1915 Farmers Bank Bldg.,
Pittsburgh, Pa.

Clark, Chas. H.,
Pres., Clark Car Co.,
929 Union Trust Bldg.,
Pittsburgh, Pa.

Clark, Harvey,
Robert H. Blackall,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Clement, M. W.,
Gen. Mgr., Penna. System,
Penna. Station,
Pittsburgh, Pa.

Clements, B. A.,
Vice-President, Rome Iron
Mills Inc.,
17 E 42nd St.,
New York City, N. Y.

Clemmer, H. L.,
Rep. J. B. Sipe & Co.,
Bridgeville, Pa.

Clifford, L. R.,
Clerk to Train Master,
P. C. & Y. Ry.,
McKees Rocks, Pa.

Code, Charles J..
Asst. Supervr., Penna. System,
201 Chess St.,
Monongahela City Pa.

Code, J. G.,
Gen. Mgr.,
Jefferson-S'western R. R. Co,
1401 Shawnee Road,
Mt. Vernon, Ill.

Coe, C. W.,
3018 Washington Blvd.,
Cleveland Heights, O.

Coffin, J. S.,
Chairman, Franklin Ry.
Supply Co.,
17 E. 42nd St.,
New York City, N. Y.

Coffin, W. E.,
Con. Engr., National
Malleable Castings Co.,
10600 Quincy Ave., S. E.,
Cleveland, O.

Coleman, Jacob C.,
Clerk, Union R. R. Co.,
707 Middle St.,
Braddock, Pa.

Collins, C. I.,
Fore. Tank Shop,
Penna. System,
551 Fourth St.,
Pitcairn, Pa.

Conlon, John F.,
Clerk, P. & L. E. R. R.,
547 Canal St.,
Beaver, Pa.

Connell, Wm. H., Jr.,
Sales Engr.,
Consolidated Machine
Tool Corporation,
416 Oliver Bldg.,
Pittsburgh, Pa.

Conner, W. P.,
Efficiency Expert, P. R. R.,
512 Main St.,
Monongahela City, Pa.

Conway, J. D.,
Sect'y-Treas., Railway Supply
Manufacturer's Association,
1841 Oliver Bldg.,
Pittsburgh, Pa

Cook, Thos. R.,
V. P. & Gen. Mgr.,
Westinghouse Union Battery Co.,
5443 Forbes St.,
Pittsburgh, Pa.

Cooke, D. C.,
Special R. R. Rep.,
Chicago Pneu. Tool Co.,
6 East 44th St.,
New York City.

Cooper, C. E.,
T. M., Penna. System,
204 Emerson Ave.,
Sharpsburg, Pa.

Cooper, Harry,
Gang Fore., Penna. System,
641 Sixth St.,
Pitcairn, Pa.

Cooper, J. P.,
Com. Dept., W.A.B.Co.,
care Tonnaluka Club,
Wilmerding, Pa.

Cope, E. E.,
M. M. B., R. & P. R. R.,
Dubois, Pa.

Copeland, T. T.,
Road Foreman Eng's.,
Carnegie Steel Co.,
Munhall, Pa.

Corns, A.,
Power Clerk, Western Penna.
Div., Penna. System,
206 Penna. Station,
Pittsburgh, Pa.

Cotton, C. S.,
Checker,
Engr. Dept., P. S. C. Co.,
84 Hodgson Ave.,
Crafton, Pa.

Coulter, A. F.,
G. C. F., Union R. R. Co.,
East Pittsburgh, Pa.

Coumis, Gust.,
Draftsman, Standard Steel
Car Co.,
Butler, Pa.

Courson, C. L.,
Gen. Fore. Car Insp'r.,
Penna. System,
Box 428, Pitcairn, Pa.

Courson, J. F.,
Genl. Foreman, Car Dept.,
Penna. System,
Pitcairn, Pa.

Courtney, Harry,
Mech. Engineer, P. & L. E.
520 Griffin Ave.,
Mt. Oliver Sta.,
Pittsburgh, Pa.

Covert, Wm. T.,
Engr. M. of W.,
Penna. System,
320 Penna Station,
Pittsburgh, Pa.

Covey, H. S.,
Sec'y., The Cleveland Pneu.
Tool Co.,
3734 East 78th St.,
Cleveland, Ohio

Cox, W. C.,
Smoke Inspector,
B. & O. R. R.,
5647 Second Ave.,
Pittsburgh, Pa.

Coyle, Dickson K.,
R. H. Blackall,
1305 Farmers Bk. Bldg.,
Pittsburgh, Pa.

Crawford, D. F.,
Vice Pres., Locomotive
Stoker Co.,
5243 Ellsworth Ave.,
Pittsburgh, Pa.

Crenner, Jos. A.,
Dist. Mgr., Dearborn
Chemical Co.,
710 Farmers Bank Bldg.,
Pittsburgh, Pa.

Crock, Geo. M.,
Engineer, P. R. R.,
425 Third St.,
Pitcairn, Pa.

Croke, Thos. F.,
Fore. Annealing Dept.,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Cronin, M. F.,
Lead Clerk, Peenna System,
Box 453,
Derry, Pa.

Crouser, Claude S.,
M. P. Inspr., P. R. R.,
204 Penna. Station,
Pittsburgh, Pa.

Cudleigh, J.,
Chief Inspector,
Engine Supplies,
N. S. W. Gov't. Ry.,
Sydney, Australia

Cullen, James K.,
President,
Niles-Bement-Pond Co.,
111 Broadway,
New York City, N. Y.

Cunningham, F. F.,
Engineer, B. & O. R. R.,
5234 Gertrude St.,
Pittsburgh, Pa.

Cunningham, H. R.,
Clerk, P. S. C. Co.,
1319 Adam St.,
N. S., Pittsburgh, Pa.

Cunningham, Howard L.,
Asst. Chief Estimator,
Engr. Dept.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Cunningham, J. L.,
Supt. M. P., P. R. R.,
207 Penna. Station,
Pittsburgh, Pa.

Cunningham, R. I.,
Mech. Expert. W. A. B. Co.,
436 Franklin Ave.,
Wilkinsburg, Pa.

Cuthbert, C.,
Gang Fore., Penna. System,
814 Wood St.,
Wilkinsburg, Pa.

Daley, John,
Cond'r., P. C. & Y. Ry.,
Yard Office,
McKees Rocks, Pa.

Daly, P. J.,
Gang Fore., Car Dept.,
P. C. C. & St. Louis Ry.,
3145 W. Carson St.,
Corliss Station,
Pittsburgh, Pa.

Dalzell, Joseph,
Fore. Car Insp'rs.,
Penna. System.
7408 Susquehanna St.,
E. E., Pittsburgh, Pa.

Dambach, C. O.,
Gen. Supt., P. & W. Va. Ry.,
Wabash Bldg.,
Pittsburgh, Pa.

Damore, S. A.
Steam Ditcher Engr.,
P. & L. E. R. R.,
P. O. Box 1411,
Monessen, Pa.

Danforth, G. H.,
Structural Engineer,
J. & L. S. Co.,
3rd Ave. and Ross St.,
Pittsburgh, Pa.

Daniel, J. V.,
Levelman, B. & O. R. R.,
Weston, W. Va.

Daniels, Geo. L.,
Draftsman, Cambria Steel Co.,
506 Golde St.,
Johnstown, Pa.

Darrah, Charles B.,
Asst. Supt. of Tel. & Signals,
P. R. R. Co., Monon. Div.,
304 Federal St. Sta.,
Pittsburgh, Pa.

Dashiell, J. W.,
Ticket Agent,
B. & O. R. R. Co.,
Glenwood Station,
Pittsburgh, Pa.

Davidson, D. B.,
Gang Fore., Penna. System,
114 Walter St.,
Derry, Pa.

Davis, Chas. S.,
Traffic Mgr.,
Standard Tin Plate Co.,
Canonsburg, Pa.

Davis, H. J.,
General Superintendent,
Carnegie Steel Co.,
Clairton, Pa.

Davison, Charles R.,
Mech. Engr.,
Loco. Stoker Co.,
30 W. Robinson St.,
N. S., Pittsburgh, Pa.

Day, George W. C.,
Division Operator,
B. & O. R. R.,
718 North Ave.,
Wilkinsburg, Pa.

Day, Paul,
Pres. Boyden Steel Corp'n.,
902 Standard Oil Bldg.,
Baltimore, Md.

Deabner, Herman J.,
Boiler Maker, E. T. Stl Wks.,
238 No. Elizabeth St.,
Hazelwood, Pittsburgh, Pa.

Deane, Robert,
Asst. T. M., B. & O. R. R.,
104 Glen Caladah St.,
Pittsburgh, Pa.

Deckman, E. J.,
Pres., E. J. Deckman Co.,
902 Oliver Bldg.,
Pittsburgh, Pa.

Dehne, G. C.,
Asst. Secy., W. A. B. Co.,
Wilmerding, Pa.

DeLaney, Grover C.,
Fore. Constr'n.,
Ally. Co. Road Dep't.,
324½ Ohio Ave.,
Glassport, Pa.

DeLaney, V. W.,
Superintendent Transp'n.,
Youngstown Sheet &
Tube Co.,
Youngstown, Ohio

Dellmin, T. D.,
Supt. Lake Erie &
Eastern R. R.,
Struthers, Ohio

DeMoske, Chas. E.,
Timekeeper, Penna. System,
1003 Penn Ave.,
Pittsburgh, Pa.

DeRemer, C. A.,
Engineman, B. & O. R. R.,
207 Blanchard St., 7th Wd.,
New Castle, Pa.

Devans, E. J.,
Gen. Supt.,
B. R. & P. Ry.,
Du Bois, Pa.

DeVilbiss, E. B.,
M. M., Penna. System,
1267 Cleveland Ave., N. W.,
Canton, Ohio.

DeVore, Harry T.,
General Foreman,
Car Shop, P. & L. E. R. R.,
723 Lucius Ave.,
Youngstown, Ohio

De Vou, James L.,
Erecting Mgr.,
American Bridge Co.,
1525 Frick Bldg.,
Pittsburgh, Pa.

Dickinson, F. W.,
M. C. B.,
B. & L. E. R. R. Co.,
117Clinton St.,
Greenville, Pa.

Dickinson, Geo.,
Engineer,
P. & L. E. R. R.,
Dawson, Pa.

Diefenbach, Harry A.,
Salesman,
Baldwin Loco. Works,
375 Union Arcade Bldg.,
Pittsburgh, Pa.

Dietrich, O. M.,
A. B. Mach., Penna. System,
470 Irvin Ave.,
Rochester, Pa.

Donovan, Edw. J.,
Pass'r. Cond'r., P. R. R.,
5359 Broad St.,
E. E., Pittsburgh, Pa.

Donovan, J. J.,
Gen. Fore., P. & L. E. R. R.,
426 Jones St.,
Bellevernon, Pa.

Dorfeld, F. C.,
Psr. Clerk, Penna. System,
214 Virginia Ave.,
Sharpsburg, Pa.

Douglass, W. N.,
Asst. Fore., Pitts. Term'l.,
P. R. R.,
117 Railroad Ave.,
Carnegie, Pa.

Down, S. G.,
Vice President, Westinghouse
Air Brake Co.,
Wilmerding, Pa.

Doyle, Wm. E.,
Asst. C. C., P. & L. E. R. R.,
1120 Race St.,
McKees Rocks, Pa.

Draper, Thos.,
Manager, Draper Mfg. Co.,
Port Huron, Mich.

Dudley, J. C.,
Asst. R. F. of E., Penna. System,
Pitcairn, Pa.

Dudley, S. W.,
Prof. Mech. Engrg.,
Yale University,
400 Temple St.,
New Haven, Conn.

Duff, Samuel E.,
Consulting Engineer,
712 Magee Bldg.,
Pittsburgh, Pa.

Dunbar, Harold F.,
Sales Rep., The McConway & Torley Co.,
48th St. & A. V. R. R.,
Pittsburgh, Pa.

Dunn, Samuel O.,
Editor, Railway Age Gazette,
608 So. Dearborn St.,
Chicago, Ill.

Durant, C. H.,
C. C. to Supt.,
B. & O. R. R.,
133 Hazelwood Ave.,
Pittsburgh, Pa.

Durkin, Jas. E.,
Supt. of Production,
Ft. Pitt Mall. Iron Co.,
812 Thompson Ave.,
McKees Rocks, Pa.

Durkin, Wm. L.,
Fore. Hard Iron Room,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Eagan, D. F.,
Asst. T. M. & Div. Opr.,
Penna. System,
39 Mt. Oliver St.,
Pittsburgh, Pa.

Eagan, J. T.,
R. F. of E., B. R. & P. R. R.,
208 W. Scribner Ave.,
Dubois, Pa.

Eberle, Fred H.,
Clerk, P. & L. E. R. R.,
Glenwillard, Pa.

Edmunds, Frank W.,
Eastern Sales Mgr.,
Sunbeam Elec. Mfg. Co.,
52 Vanderbilt Ave.,
New York, N. Y.

Edwards, Clifton H.,
Storekeeper, Ft. Pitt Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Edwards, Jos. L.,
Dist. Rep., F. J. Ryan & Co.,
223 Oliver Bldg.,
Pittsburgh, Pa.

Eichenlaub, W. C.,
Secretary,
Union Steel Casting Co.,
62nd St. & A. V. Ry.,
Pittsburgh, Pa.

Eisenbeis, W. H.,
Ass't. Sales Manager,
Union Steel Casting Co.,
62nd and Butler Sts.,
Pittsburgh, Pa.

Elder, C. K.,
Auditor, Monon Ry. Co.,
Box 158,
Brownsville, Pa.

Elliot, A. H.,
Sales Engineer, American Brake Shoe and Fdry. Co.,
30 Church St.,
New York, N. Y.

Elliott, M. W.,
Manager, Consumers Oil Co.,
1016 Constance St.,
N. S., Pittsburgh, Pa.

Elliott, J. S.,
Gang Foreman, P. R. R. Co.,
P. O. Box 265,
West Brownsville, Pa.

Ellis, A. R.,
Gen. Mgr., Pitts. Test. Lab.,
P. O. Box 1115,
Pittsburgh, Pa.

Ellis, C. B.,
Gen. Traffic Manager,
Gulf Refining Co.,
1468 Frick-Annex,
Pittsburgh, Pa.

Ellis, Frank I.,
Consulting Engr.,
2126 Farmers Bank Bldg.,
Pittsburgh, Pa.

Ellis, Harry T.,
Shop Inspr., Penna. System,
1325 Derry St.,
Harrisburg, Pa.

Elsey, Warren R.,
Asst. Master Mechanic,
Penna. System,
Conemaugh, Pa.

Elverson, H. W.,
Works Manager,
Pressed Steel Car Co.,
Pittsburgh, Pa.

Emerick, Jesse C.,
Production Checker,
Penna. System,
534 Gross St.,
Pittsburgh, Pa.

Emerick, Thomas,
Gang Fore., Penna. System,
540 Gross St.,
Pittsburgh, Pa.

Emery, E.,
Railway Supplies,
1537 Oliver Bldg.,
Pittsburgh, Pa.

Endsley, Louis E.,
516 East End Ave.,
Pittsburgh, Pa.

England, Alexander,
Chief Engineer,
W. A. B. Co.,
428 Biddle Ave.,
Wilkinsburg, Pa.

Estabrook, H. M.,
Spl. Rep., Standard Steel
Car Co.,
Frick Building,
Pittsburgh, Pa.

Evans, L. F.,
Gang Fore., Penna. System,
509 Hawkins Ave.,
No. Braddock, Pa.

Eves, R. W.,
Electrical Supervisor,
B. & O. R. R. Co.,
306 B. & O. Station,
Pittsburgh, Pa.

Fair, Charles,
Fore. Car Repairs,
Penna. System,
Conemaugh Div.,
Sharpsburg Shop,
Sharpsburg, Pa.

Faix, Joseph,
P. W. I. F., P. & L. E. R. R.,
637 Michigan Ave.,
Glassport, Pa.

Farmer, C. C.,
Director of Engr'g.,
W. A. B. Co.,
Wilmerding, Pa.

Farrell, Henry E.,
Pres. P. & W. Va. Ry.,
Wabash Bldg.,
Pittsburgh, Pa.

Fay, Frank L.,
President,
Greenville Steel Car Co.,
Greenville, Pa.

Feehrer, Maurice L.,
Gang Fore., Penna. System,
2310 Manor Ave.,
Swissvale, Pa.

Fendner, W. J.,
Engineer, Clark Car Co.,
1619 Oliver Bldg.,
Pittsburgh, Pa.

Ferguson, O. G.,
Assistant to G. M.,
Monon. Conn. R. R.,
5604 Pocussett St.
Pittsburgh, Pa.

Ferree, Harry W.,
Gen'l. Forc., P. & L. E. R. R.,
McKees Rocks, Pa.

Ferren, Robert O.,
Locomotive Engineer,
Penna. R. R. Co.,
113 Lexington Ave.,
Sharpsburg, Pa.

Fettinger, H. O.,
Rep., Ashton Valve Co.,
126 Liberty St.,
New York City.

Fieldson, P. H.,
General Foreman,
P. & L. E. R. R.,
Box 177,
Vanderbilt, Pa.

Fike, Jas. W.,
Movement Director,
Penna. System,
7623 Race St.,
Pittsburgh, Pa.

Finegan, Leo,
Gen. Mgr.,
Amer. Flexible Bolt Co.,
Zelienople, Pa.

Fink, Peter J.,
General Foreman,
P. & L. E. R. R.,
Woodlawn Car Shop,
Woodlawn, Pa.

Fischer, Geo. E. A.,
Clerk, Union R. R.,
518 Fourth St.,
Braddock, Pa.

Fisher, John, J.,
Trav. Car Insp'r., Union R.R.,
7429 McClure Ave. ,
Swissvale, Pa.

Fitzgerald, T.,
Engineer,
755 Century Bldg.,
Pittsburgh, Pa.

Fitzsimmons, E. S.,
Mgr. Sales,
Flannery Bolt Co.,
Vanadium Bldg.,
Pittsburgh, Pa

Flaherty, P. J.,
Pres. and Gen'l. Mgr.,
Johnson Bronze Co.,
New Castle, Pa.

Flannery, J. Rogers,
Vice Pres. Flannery Bolt Co
Vanadium Bldg.,
Pittsburgh, Pa.

Fletcher, R. H.,
Checker, Engr. Dep.,
P. S. C. Co.,
35 S. Bryant Ave.,
Bellevue, Pa.

Forbes, T. E.,
Salesman, Ingersoll Rand Co.
706 Chamber of Commerce
Bldg.,
Pittsburgh, Pa.

Forney, H. L.,
Master Carpenter,
B. & O. R. R.,
130 Hazelwood Ave.,
Pittsburgh, Pa.

Forrest, C. H.,
Foreman, P. & L. E. R. R.,
851 Sixth Ave.,
Coraopolis, Pa.

Forster, J. A.,
Storekeeper,
Penna. System,
544 Peebles St.,
Wilkinsburg, Pa.

Foster, F. L.,
C. C. to Supt. Frt. Transp'n.,
P. & L. E. R. R.,
Pittsburgh, Pa.

Foster, John S.,
Engr., W. L. E. & P. T. Ry.,
200 So. Cedar St.,
Massillon, Ohio.

Fowler, W. E., Jr.,
Sales Rep.,
Davis Brake Beam Co.,
1602 Oliver Bldg.,
Pittsburgh, Pa.

French, Geo., Jr.,
Clerk, Penna. System,
4816 Cypress St.,
Pittsburgh, Pa.

Freshwater, F. H.,
Sales Agent,
Pressed Steel Car Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Frey, A. R.,
Draftsman,
Pressed Steel Car Co.,
3458 Fleming Ave.,
N. S., Pittsburgh, Pa.

Frost, Harry W.,
President. The Frost
Railway Supply Co.,
1048 Penobscot Bldg.,
Detroit, Mich.

Fults, J. J.,
Clerk, J. & L. Steel Co.,
18 So. Euclid Ave.,
Bellevue, Pa.

Fults, John H.,
Asst. Cashier,
Penna. System,
425 Penna. Station,
Pittsburgh, Pa.

Furch, George,
E. H. Fore., Penna. System,
Fulton Rd. & East St.,
N. S., Pittsburgh, Pa.

Galinis, J. W.,
Draftsman, Penna. System,
311 Westinghouse Ave.,
Wilmerding, Pa.

Gallagher, T. J.,
Gang Fore., Penna. System,
4209 Dunkeld St.,
Pittsburgh, Pa.

Gallinger, Geo. A.,
Manager, Pneumatic Tool
Sales, Ingersoll-Rand Co.,
11 Broadway,
New York, N. Y.

Gallowich, Louis,
Car insp'r., Penna. System,
3 Matson St.,
N. S., Pittsburgh, Pa.

Gammiere, E. J.,
Fore. Core Dept.,
Ft. Pitt Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Gardner, George R.,
Rate Clerk, Pitts. Coal Co.,
1024 Oliver Bldg.,
Pittsburgh, Pa.

Gardner, K. C.,
Vice Pres.,
Greenville Steel Car Co.,
Greenville, Pa.

Garland, W. L.,
V. P., Safety Car Htg. &
Ltg. Co.,
1738 Commercial Trust
Building,
Philadelphia, Pa.

Garner, Curtis S.,
Div. Mgr. Amer. Bridge Co.,
1418 Frick Bldg.,
Pittsburgh, Pa.

Garratt, Louis W.,
Rep. Virginia Equipment Co.,
Bourse Bldg.,
Philadelphia, Pa

Gates, H. D.,
Service Engr.,
The Pilliod Co.,
215 Washington Ave.,
Dunkirk, N. Y.

Gaw, F. W.,
George Oldham & Son Co.,
527 Commercial Trust Bldg.
Philadelphia, Pa.

Geisler, Jos. J.,
Mech. Engineer,
Ft. Pitt Mall. Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Gemeiner, Wm. J.,
Commercial Agt.,
D. L. & W. R. R.,
428 Park Bldg.,
Pittsburgh, Pa.

George, M. E.,
Car Foreman,
Union R. R. Co.,
Port Perry, Pa.

Gerg, F. E.,
Mech. Engr.,
Pgh. S. & N. R. R.,
2 Erie Ave.,
St. Marys, Pa.

Germain, L., Jr.,
Pres't. Germain Lumber Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Gibson, D. W.,
Supt. Am. Ry. Express Co.,
909 Liberty Ave.,
Pittsburgh, Pa.

Gibson, Gomer A.,
Serg't. of Police,
Penna. System,
Box 68,
Roscoe, Pa.

Gibson, O. P.
Wrecking Craneman,
P. & L. E. R. R.
120 E. Schoonmaker Ave.
Monessen, Pa.

Gibson, Wm. S.,
Engr., M. of W.,
Union R. R. Co.,
1600 Union Ave.,
McKeesport, Pa.

Giles, D. J.,
Rep. Wilson Imperial Co.,
115 Chestnut St.,
Newark, N. J.

Gilg, Henry F.,
Sales Manager,
Penn I. & S. Co.,
1223 Island Ave.,
N. S., Pittsburgh, Pa.

Gillespie, John M.,
Vice-Pres't., Lockhart Iron
& Steel Company,
P. O. Box 1243,
Pittsburgh, Pa.

Gillespie, Wm. J.,
Rolling Stock Inspector,
P. & L. E. R. R.,
1127 Charles St.,
McKees Rocks, Pa.

Gillies, W. F.,
Pgh. Mgr., Ingersoll-Rand Co.,
706 Cham. of Com. Bldg.,
Pittsburgh, Pa.

Gipson, Samuel,
Gang Fore., Penna. System,
573 Fifth St.,
Pitcairn, Pa.

Glass, H. M.,
Foreman, P. R. R.,
Driftwood, Pa.

Gleason, D. T.,
Ass't. Engineer,
Standard Steel Spring Co.,
1316 Fourth Ave.,
Coraopolis, Pa.

Glenn, J. H.,
R. F. of E., P. & W. Va. Ry.,
Wabash Bldg.,
Pittsburgh, Pa.

Glynn, W. C.,
Asst. Freight Traffic Mgr.,
Penna. R. R.,
812 Penna. Station,
Pittbsurgh, Pa.

Gobrecht, John C.,
Insp'r., Dep't. of Materials
& Supplies, U. S. Railroad
Administration,
404 Boggs Ave.,
Mt. Washington,
Pittsburgh, Pa.

Goda, P. H.,
Asst. Gen. Fore., P. R. R.,
P .O. Box 73,
Pitcairn, Pa.

Goggins, J. J.,
Gang Foreman,
Penna. System,
1137 Woodland Ave.,
N. S., Pittsburgh, Pa.

Goho, L. G.,
Asst. Fore. Penna. System,
351 Second St.,
Pitcairn, Pa.

Gold, Egbert H.,
Pres. Vapor Car Htg. Co.,
Railway Exchange Bldg.,
Chicago, Ill.

Gordon, John,
Gang. Fore., Penna. System,
P. R. R. Shops,
Verona, Pa.

Gorman, J. C.,
Supt., McK. Con. R. R. Co.,
1221 Fremont Ave.,
McKeesport, Pa.

Gorsuch, C. W.,
Transportation Asst.,
B. & O. R. R.,
312 B. & O. Depot,
Pittsburgh, Pa.

Gowland, S. I.,
Asst. Gen. Storekeeper,
Penna. System,
518 Penna. Station,
Pittsburgh, Pa.

Graham, Chas. J.,
Vice President,
Graham Bolt & Nut Co.,
311 Ross St.,
Pittbsurgh, Pa.

Graham, Harry C.,
President,
Graham Bolt & Nut Co.,
1608 State Ave.,
Coraopolis, Pa.

Graham, John A.,
Steam Engr.,
522 Knoll St.,
N. S., Pittsburgh, Pa.

Grant, John W.,
Gang Fore., Penna. System,
435 Pinney St.,
Rochester Pa.

Gray, C. B.,
M. M., Penna. System,
1155 Liberty Ave.,
Pittsburgh, Pa.

Gray, Chas. W.,
Secretary-Treasurer,
Graham Bolt & Nut Co.,
1317-19 W Carson Ave,
Pittsburgh, Pa.

Gray, G. W.,
Engr., M. of W.,
Penna. System,
1120 Penna. Station,
Pittsburgh, Pa.

Gray, Guy M.,
S. M. P.,
B. & L. E. R. R. Co.,
Greenville, Pa.

Greenaway, Roy W.,
1227 Franklin Ave.,
Wilkinsburg, Pa.

Greene, W. F.,
Asst. Engr., M. of W.,
Penna. System,
320 Penna. Station,
Pittsburgh, Pa.

Grewe, H. F.,
M. M., P. & W. Va. Ry.,
1531 Goodyear Ave.,
Akron, Ohio

Grieve, Robert E.,
Passenger Train Master,
P. R. R.,
1125 Rebecca Ave.,
Wilkinsburg, Pa.

Griffin, John J.,
Shipping Clerk, Am. Fdry
& Construction Co.,
4700 Second Ave.,
Pittsburgh, Pa.

Grimm, H. M.,
Superv'r., Pitts. Term'l.,
Penna. System,
Dravowsburg, Pa.

Grimshaw, F. G.,
S. M. P., Penna. System,
500 Penna. Station,
Pittsburgh, Pa.

Grooms, J. C.,
Real Estate and Claim Agent,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Gross, Chas.,
Retired Fore.,
Penna. Lines West,
1314 Liverpool St.,
N. S., Pittsburgh, Pa.

Gross, James A.,
Y. M., Penna. System,
139 Emma St.,
Greensburg, Pa

Grove, Paul L.,
Sup't., Penna. R. R. Co.,
New York Div.,
26 Exchange Place,
Jersey City, N. J.

Guay, J. W.
Sales Eng'r., Fort Pitt
Steel Casting Co.,
McKeesport, Pa.

Guignon, W. E.,
Div. Engr., Penna. System,
Federal Street Station,
N. S., Pittsburgh, Pa.

Gurley, L. R.,
M. P. Insp'r., Penna. System,
506 Penna. Station,
Pittsburgh, Pa.

Guy, W. S.,
Ass't. Traf. Mgr., Carnegie
Steel Co.,
812 Carnegie Bldg.,
Pittsburgh, Pa.

Gwaltney, R. H.,
Manager, Eastern Sales,
The T. H. Symington Co.,
233 Broadway,
New York, N. Y.

Gwinn, Leven J.,
Engr. Dept.,
W. A. B. Co.
5759 Howe St.,
East Liberty,
Pittsburgh, Pa.

Haas, J. W.,
Fore. Labor Dept.,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Haas, John G.,
Asst. E. H. Fore.,
Penna. System,
430 Fisk St.,
Pittsburgh, Pa.

Hagerty, J. W.,
Accountant, Purch. Dept.,
Penna. System
Dravosburg, Pa.

Hale, Chas. E.,
Mgr. Pgh. Office,
Baldwin Loco. Works,
375 Union Arcade,
Pittsburgh, Pa.

Hale, Otis R.,
Dist. Sales Mgr.,
American Loco. Co.,
30 Church St.,
New York City

Hallenbeck, H. W.,
Rep., Forged Steel Wheel Co.,
1120 Frick Bldg.,
Pittsburgh, Pa.

Hallett, Henry M.,
Secy., Penna. Crusher Co.,
Peoples Bank Bldg.,
Pittsburgh, Pa.

Hambrock, O. F.,
Asst. Eng. House Foreman,
Penna. System,
2818 So. Clinton St.,
Ft. Wayne, Ind.

Hammond, H. S.,
Sales Engr.,
Pressed Steel Car Co.,
55 Broad St.,
New York, N. Y.

Hanscom, J. Richard,
Draftsman, Montour R. R.,
1100 Fourth Ave.,
Coraopolis, Pa.

Hansen, J. M.,
President,
Standard Steel Car Co.,
1120 Frick Bldg.,
Pittsburgh, Pa.

Hansen, Wm. C.,
Sales Engr., A. Stucki Co.,
419 Oliver Bldg.,
Pittsburgh, Pa.

Harding, Sherman A.,
Sales Mgr., Consolidated
Mach. Tool Co.,
1915 Oliver Bldg.,
Pittsburgh, Pa.

Hardman, Wm. M.,
Stockman, Penna. System,
539 Jeannette St.,
Wilkinsburg, Pa.

Harger, E. S.,
Fore., P. & L. E. R. R.,
1115 Second Ave.,
Coraopolis, Pa.

Harger, M. L.,
Gen. Car Fore.,
P. & L. E. R. R.,
Newell, Pa.

Harkness, W. S.,
Foreman, Penna. System,
P. O. Box 127
Pitcairn, Pa.

Harper, A. M.,
Mgr. of Sales,
Carnegie Steel Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Harris, C. A.,
Gen. Storekeeper,
Pgh. Railways Co.,
Homewood Station,
Pittsburgh, Pa.

Harris, J. P.,
C. C., to Division Engineer,
B. & O. R. R. Co.,
Wellington Apartments,
Mt. Washington,
Pittsburgh, Pa.

Harris, R. C.,
Gen. Storekeeper,
Penna. System,
517 Penna. Station,
Pittsburgh, Pa.

Harsh, H. H.,
Div. Engineer,
B. & O. R. R. Co.,
401 Water St.,
Pittsburgh, Pa.

Harshberger, W. J.,
Foreman, Penna. System,
528 Sixth St.,
Pitcairn, Pa

Harter, Arnold,
Ass't. Fore., W. A. B. Co.,
Tonnelueka Club,
Wilmerding, Pa.

Hartley, John G.,
Div. Eng'r., Penna. System,
1338 Wightman St.,
Pittsburgh, Pa

Hartshorn, E. F.,
Gang Fore., Penn. System,
7607 Susquehanna St.,
Pittsburgh, Pa.

Hartsuff, O. J. H.,
Gen. Supt., Carnegie Stl. Co.,
Edgar Thompson Works,
Braddock, Pa.

Haskin, H. L.,
Assistant Manager,
Ft. Pitt Spring & Mfg. Co.,
806 Frank St.,
McKees Rocks, Pa.

Hayes, George W.,
Air Brake Foreman,
P. & L. E. R. R.,
1225 Vance Ave.,
Coraopolis, Pa.

Hayes, J. Leo,
Roadmaster, P. C. & Y. Ry.,
200 Mary St.,
Carnegie, Pa.

Hayes, R. F.,
Railway Supplies,
2 Rector St.,
New York City.

Haynes, J. E.,
Standard Steel Spring Co.,
1047 Ridge Ave.,
Coraopolis, Pa.

Hayward, Carlton,
Production Checker,
Penna. System,
744 East End Ave.,
Pittsburgh, Pa.

Hazlett, H. H.,
Clerk, P. & L. E. R. R.,
1530 Garfield Ave.,
N. S., Pittsburgh, Pa.

Headington ,R. V.,
Asst. M. M., Penna. System,
235 Allegheny Ave.,
Oakmont, Pa.

Heckmon, C. J.,
Draftsman,
Spang, Chalfant Co.,
129 Sixth St.,
Sharpsburg, Pa.

Heigley, R. M.,
Asst. R. F. of E.,
Penna. System,
Braeburn, Pa.

Heinlein, Geo. J.,
Asst. Fore., Penna. System,
916 Grandview Ave.,
19th Ward,
Pittsburgh, Pa

Hench, Norman M.,
Engr. Track Appliances,
Carnegie Steel Co.,
313 Carnegie Bldg.,
Pittsburgh, Pa.

Henderson, Nicholas, Jr.,
Gang Fore.. Penna. System,
2690 Woodstock Ave.,
Swissvale, Pa.

Henry, C. L.,
Ass't. M. M., Penna. System,
Allegheny Shops,
N. S., Pittsburgh, Pa.

Herlehy, David T.,
P. W. I. F., P. & L. E. R. R.,
817 Vermont Ave,
Glassport, Pa

Herron, B. J.,
Sales., Independent Pneu.
Tool Co.,
718 Bessemer Bldg.,
Pittsburgh, Pa.

Herron, Guy C.,
C. C. to Supt. Teleg.,
P. & L. E. R. R.,
64 Terminal Annex Bldg.,
Pittsburgh, Pa.

Hershey, Quincy W.,
Sales Mgr.,
R. D. Nuttall Co.,
McCandless & Harrison
Ave.,
N. S., Pittsburgh, Pa.

Hess, L. H.,
Loco. Fireman,
P. & L. E. R. R.,
Box 272,
Roscoe, Pa.

Hettler, R. C..
Penna. Lines,
1722 Brighton Road,
N. S., Pittsburgh, Pa.

Hewlett, H. D.,
Asst. Genl. Foreman,
P. & L. E. R. R.,
c-o M. C. B. Office,
McKees Rocks, Pa.

Hildenbrand. L. B.,
Asst. G. C. F., P. &
W. Va. Ry..
2141 Chaplain St.,
Wheeling, W. Va.

Hill, J. F..
Asst. S. M. P. & C.,
W. & L. E. R. R.,
Brewster, Ohio

Hindman, S. M.,
Schaefer Equipment Co.,
Oliver Bldg.,
Pittsburgh, Pa.

Hipps, Harry G.,
Cost Acct., Blaw-Knox Co.,
2222 Milligan Ave.,
Swissvale, Pa.

Hoen, G. L.,
Superintendent,
National Car Wheel Co.,
West Homestead, Pa.

Hoffman, Chas. T.,
E. H. Fore., P. R. R.,
Conway, Pa.

Hoffstot, H. P.,
Vice President,
Pressed Steel Car Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Holbrook, W. H.,
R. F. of Engs.,
Penna. System, P. H. Div.,
3273 Ashlyn St.,
Pittsburgh, Pa.

Holmes, E. H.,
Supt. of Service,
Ft. Pitt Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Holt, Arthur E.,
Gang Fore., Penna. System,
1717 Crestline St.,
Wilkinsburg, Pa.

Hood, D. G.,
General Agent,
P. & L. E. R. R. Co.,
Pittsburgh, Pa.

Hood, J. M.,
Chemist, Ft. Pitt Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Hoover, Robert C.,
Machinist, Penna. System,
Pitcairn, Pa.

Hopkins, H. V.,
Train Master,
B. & L. E. R. R.,
Bessemer Bldg.,
Greenville, Pa.

Horan, John A.,
Gang Fore., Penna. System,
Pitcairn Car Shops,
Pitcairn, Pa.

Hord, Peyton R.,
Pgh. Mgr., American Engineering Co.,
828 Oliver Bldg.,
Pittsburgh, Pa.

Hornbeck, W. E.,
Foreman, P. R. R.,
Sylvan St.,
Verona, Pa.

Hostettler, L. W.,
Supt. Stamping Dept.,
Allegheny Steel Co.,
Brackenridge, Pa.

Housman, Walter E.,
Asst. M. E.,
H. C. Frick Coke Co.,
Scottdale, Pa.

Howe, Chester A.,
Purch. Agent,
P. & W. Va. Ry.,
405 Wabash Bldg.,
Pittsburgh, Pa.

Howe, David M.,
Railway Supplies,
609 Chamber of Commerce Bldg.,
Pittsburgh, Pa.

Howe, David M., Jr.,
Routing Clk., J.&L. Steel Co.,
224 Balph Ave.,
Bellevue, Pa.

Howe, W. C.,
Pres., Std. Inspection Co.,
Century Bldg.,
Pittsburgh, Pa.

Huber, H. G.,
Asst. Engr. M. P., P. R. R.,
204 Pennsylvania Station
Pittsburgh, Pa.

Huchel, Wm. J.,
Foreman Carpenters,
Pressed Steel Car Co.,
817 Eleventh St.,
McKees Rocks, Pa.

Hudson, Wm. L.,
Road Foreman Engines,
P. R. R. Co.,
Room 323 Penna. Sta.,
Pittsburgh, Pa.

Huff, Geo. F., Jr.,
Secy., Owen China Co.,
P. O. Box 456,
Minerva, Ohio.

Hughes, J. E.,
Supt., P. & L. E. R. R.,
123 Maple Terrace,
Pittsburgh, Pa.

Hughes, Jos. T.,
Assistant Manager,
H. M. Myers Co.,
Beaver Falls, Pa.

Hughes, Wm.,
Draftsman, P. S. C. Co.,
44 S. Howard St.,
Bellevue, Pa.

Hultman, C. H.,
Draftsman, P. S. C. Co.,
99 Grant Ave.,
Bellevue, Pa.

Humphrey, A. L.,
President,
Westinghouse Air Brake Co.
Wilmerding, Pa.

Hunter, H. S.,
President,
Hunter Saw & Mach. Co.,
57th and Butler Sts.,
Pittsburgh, Pa.

Hush, Geo., Jr.,
Salesman, Manning, Maxwell & Moore, Inc.,
1005 Park Bldg.,
Pittsburgh, Pa.

Hussong, Albert C.,
Asst. G. F. Pass. Car Inspr.,
P. R. R. Co.,
232 Chadwick St.,
Sewickley, Pa.

Hyndman, F. T.,
3115 Lincoln Blvd.,
Cleveland, Ohio

Hyndman, H. R.,
Washington Run R. R. Co.,
2211 First Nat. Bk. Bldg.,
Pittsburgh, Pa.

Hyndman, N. P.,
Genl. Freight & Pass. Agent,
Washington Run R. R. Co.,
2211 First Nat. Bk. Bldg.,
Pittsburgh, Pa.

Ingraham, Langley,
Gen. Sales Mgr., Rwy. Dept.,
The Lowe Bros. Co.
Dayton, Ohio.

Inks, S. W.,
General Foreman.
P. & L. E. R. R.,
Box 253,
Dawson, Pa.

Jack, R. Ralph,
Asst. Paymaster,
Union R. R. Co.,
East Pittsburgh, Pa.

Jackson, F. E.,
Asst. to Treas.,
Penna. System,
425 Penna. Station,
Pittsburgh, Pa.

Jacobs, M. H.,
Asst. Genl. Frt. Agent,
Western Maryland Ry.,
317 Wabash Bldg.,
Pittsburgh, Pa.

Jefferson, E. Z.,
2115 Farmers Bank Bldg.,
Pittsburgh, Pa.

Jenkins, R. H.,
Rep., Nathan Mfg. Co.,
21 E. 40th St.,
New York City

Jenny, W. G.,
Gang Fore., Penna. System,
1152 Brownsville Road,
Carrick., Pitts., Pa.

Johnson, A. B.,
Sales Engr., Standard Steel Car Company,
1120 Frick Bldg.,
Pittsburgh, Pa.

Johnson, B. S.,
Sales Engr., W. H. Miner,
667 Rookery,
Chicago, Ill.

Johnson, E. A.,
General Sales Manager,
Duff Mfg. Co.,
Preble Ave.,
N. S., Pittsburgh, Pa.

Johnson, I. S.,
Resident, Material Inspector,
Penna. System,
Room 603-1013 Penn Ave.
Pittsburgh, Pa.

Johnson, J. F.,
Engineer,
Pittsburgh Plate Glass Co.,
618 Orchard Ave.,
Bellevue, Pa.

Johnson, J. W.,
City Mgr., Amer. Rwy. Express Co.,
909-911 Liberty Ave.,
Pittsburgh, Pa.

Johnson, Wm. M.,
Superintendent,
B. & L. E. R. R.,
Greenville, Pa.

Johnston, J. C.,
Yard Master,
Union R. R. Co.,
N. Bessemer, Pa.

Johnston, W. A.,
Gang Fore., Penna. System,
449 Eleanor St.,
Pitcairn, Pa.

Jones, David J.,
M. M., McK. Connect. R. R.,
1405 Patterson St.,
McKeesport, Pa.

Jones, Ernest A.,
Clerk, P. & L. E. R. R.,
334 Columbia Ave.,
West View, Pitts., Pa.

Jones, John H.,
Gang Fore., Penna. System,
308 Carver St.,
Pittsburgh, Pa.

Jordan, J. M.,
Mech. Expert,
Loco. Stoker Co.,
202 So. Jefferson St.,
Punxsutawney, Pa.

Judge, James,
Gang Fore., Penna. System,
1204 Resaca Place,
N. S., Pittsburgh, Pa.

Jungbluth, A.,
Steam Engr.,
E. E. Savings & Trust Co.,
6202 St. Marie St.,
E. E., Pittsburgh, Pa.

Kaiser, Robert,
Foreman, P. R. R. Co.,
157 Reiter St.,
E. E., Pittsburgh, Pa.

Karam, I. A.,
M. P. Insp'r., Penna. System,
204 Penna. Station,
Pittsburgh, Pa.

Karnes, W. T.,
General Foreman,
P. & L. E. R. R.,
330 Ohio Ave.,
Glassport, Pa

Kasnitz, J. J.,
J. Toner Barr,
5715 Rural St.,
Pittsburgh, Pa.

Kasnitz, Jesse,
J. Toner Barr.
5715 Rural St.,
E. E., Pittsburgh, Pa.

Kaup, Harry E.,
Gen. Supt.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Kavanagh, D.,
Storekeeper, Union R. R.,
400½ Fairview Ave.,
Turtle Creek, Pa.

Kearney, J. W.,
Mgr. of Sales, Canton Car Co.,
Canton, Ohio

Keenen, J. W.,
Train Master, P. R. R.,
South Fork, Pa.

Keenoy, R. P.,
Supt., Trans., American
Steel and Wire Co.,
15th St. and Penn Ave.,
Pittsburgh, Pa.

Kegel, Arthur E.,
Chief Acct. Clerk,
Penna. System,
731 Bryn Mawr Road,
Pittsburgh, Pa.

Kegel, R. C.,
Special Agt., Penna. System,
Eastwood Road,
Wilkinsburg, Pa.

Keiser, John,
Passenger Trainmaster,
Penna. R. R.,
425 Center St.,
Wilkinsburg, Pa.

Kelin, H. S.,
Draftsman, Union R. R. Co.,
602 Chautauqua St.,
Pittsburgh, Pa.

Keller, D. P.,
Insp'r. Transp'n.,
P. & W. Va. Ry.,
524 Forest Ave.,
Carnegie, Pa.

Keller, W. H.,
President,
W. H. Keller, Inc.,
Fulton St.,
Grand Haven, Mich

Kelley, Henry D.,
District Manager,
Metal & Thermit Corp.,
1514 Fayette St.,
N. S., Pittsburgh, Pa.

Kelley, J. B.,
President & Manager,
Monongahela House,
Pittsburgh, Pa.

Kelly, Harry S.,
Forc. Pattern Vault,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Kelly, H. B.,
Gen. R. F. of E.,
P. & L. E. R. R.,
821 Davis Ave.,
McKees Rocks, Pa.

Kelly, J. P.,
Gen. Y .M.,
P. & L. E. R. R.,
46 N. Truesdale Ave.,
Youngstown, O.

Kelly, J. W.,
Boiler Tube Expert,
National Tube Co.,
515 N. Grove Ave.,
Oak Park, Ill.

Kelly, Leo J.,
Superintendent,
Ft. Pitt Mall. Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Kempton, J. W.,
Gen. Sec'y., Y. M. C .A.
P. & L. E. R. R.,
Newell, Pa.

Kennedy, Julian,
Consulting Engineer,
Bessemer Bldg.,
Pittsburgh, Pa.

Kendig, J. C.,
Asst. T. M., B. & L. E. R.R.
Albion, Pa.

Keppel, H. H.,
Div. Acct., Penna. System,
216 Penna. Station.
Pittsburgh, Pa.

Keptner, J. B.,
Coal Insp'r., P. & L. E. R. R.,
1527 Napolean St.,
Beechview, Pitts., Pa.

Kerby, Frederick,
Supr. Loco. Operation,
B. & O. R. R.,
143 Bedford St.,
Cumberland, Md.

Khuen, Richard, Jr.,
Gen'l. Mgr. Erection,
American Bridge Co.,
Frick Building,
Pittsburgh, Pa.

Kinch, L. E.,
Signal Insp'r., P. R. R.,
807 Mellon St.,
E. E., Pittsburgh, Pa.

Kindle, W. F.,
Insp'r. Carnegie Steel Co.,
836 Russellwood Ave.,
McKees Rocks, Pa.

King, C. F., Jr.,
Asst. Forc., Power Plants,
Penna. System,
Box 19, Penna. Station,
Pittsburgh, Pa.

King, J. W., Jr.,
C. C. to Traffic Mgr.,
Pittsburgh Coal Co.,
1024 Oliver Bldg.,
Pittsburgh, Pa.

Kinter, D. H ,
Gen'l. Foreman, Car. Dept.,
Monongahela R. R. Co.,
Brownsville, Pa.

Kirkpatrick, H. F.,
Chief Clerk,
Union Steel Castings Co.,
62nd and Butler Sts.,
Pittsburgh, Pa.

Klee, W. B.,
President,
Damascus Bronze Co.,
928 South Ave.,
Pittsburgh, Pa.

Kleinhans, H.,
Pres., H. Kleinhans Co.,
458 Union Trust Bldg..
Pittsburgh, Pa

Klingelhofer, C. T.,
Traffic Supt., American Fdry.
and Construction Co.,
2d Ave. & Longworth St.,
Pittsburgh, Pa.

Knapp, A. D.,
Vice President,
Nicola Lumber Co.,
1410 Farmers Bk. Bldg.,
Pittsburgh, Pa.

Knox, Wm. J.,
Mechanical Engineer,
B. R. & P. Ry. Co.,
DuBois, Pa.

Koch, Felix,
Mechanical Engr.,
Pressed Steel Car Co.,
Pittsburgh, Pa.

Koch, John J.,
Frt. Traf. Mgr.,
Penna. System,
810 Penna. Station,
Pittsburgh, Pa.

Kochlinger, C. W. H.,
Mechanical Inspector,
Penna. System,
323 So. Wells St.,
Room 505,
Chicago, Ill.

Kohl, H. J.,
Gen. Car Fcre.,
P. & L. E. R. R.,
1106 Tweed St.,
Pittsburgh, Pa.

Kohute, Hilary Geo.,
Clerk, Union R. R.,
East Pittsburgh, Pa.

Kraft, Clyde E.,
Clerk, Penna. System,
211 Linden Ave.,
Sharpsburg, Pa.

Kramer, J. Kenneth,
Clerk, P. & L. E. R. R.,
166 Ulysses St.,
Mt. Washington,
Pittsburgh, Pa.

Kranse, Harry A.,
Gang Fore., Penna. System,
160 Race St.,
Swissvale, Pa.

Krepps, T. S.,
Engineman, P. R. R. Co.,
2114 Eccles St.,
Pittsburgh, Pa.

Kroske, J. F.,
Salesman, Ingersoll Rand Co.,
706 Chamber of Commerce
Bldg.,
Pittsburgh, Pa.

Kummer, Jos. H.,
Sup't. of Orders,
Fort Pitt Mall. Iron Co.,
209 Greydon Ave.,
McKees Rocks, Pa.

Lackner, R. A.,
V. P., Neely Nut & Bolt Co.,
26 So. 22nd St.,
Pittsburgh, Pa.

Ladd, Geo. T.,
Geo. T. Ladd Co.,
1606 First Nat'l. Bk. Bldg.,
Pittsburgh, Pa.

Laird, E. C.,
Pres. & Mng. Editor,
Railroad Herald,
598 W. Peachtree St.,
Atlanta, Ga.

Laird, Geo. R.,
Clerk, Penna. System,
140 Meadow St.,
Pittsburgh, Pa.

Lake, Albert H.,
Draftsman, Engr'g. Dept.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Lanahan, Frank J.,
President, Fort Pitt
Mall. Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa

Lanahan, J. S.,
Vice-President, Fort Pitt
Mall. Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa

Landgraf, F. K.,
General Supt.,
Flannery Bolt Co.,
60 Hawthorne Ave.,
Crafton, Pa

Landis, W. C.,
Designing Engr.,
Westinghouse Air Brake Company,
7328 Race St.,
Pittsburgh, Pa.

Lang, W. C.,
General Car Inspector,
P. & L. E. R. R.,
McKees Rocks, Pa.

Langbein, Paul,
Clerk, P. & L. E. R. R.,
232 North Main St.,
Sharpsburg, Pa.

Langhorst, C. W.,
E. H. Fore., Penna. System,
P. F. W. & C. Shops,
N. S., Pittsburgh, Pa.

Lanning, J. F.,
President,
J. Frank Lanning & Co.,
327 First Ave.,
Pittsburgh, Pa.

Lappe, J. C.,
Pres. Federal Sales Co.,
219 Third Ave.,
Pittsburgh, Pa.

Lauderbaugh, H. B.,
Pitts. Testing Laboratory,
7th St. & Bedford Ave.,
Pittsburgh, Pa.

Laughlin, C. W.,
President, Laughlin-Barney Mach'y. Co.,
483 Union Arcade Bldg.,
Pittsburgh, Pa.

Laughlin ,Richard J.,
Asst. C. C., Penna. System,
1470 Edgehill Ave.,
Dormont, Pittsburgh, Pa.

Laughner, Carl L.,
Gen'l. Foreman, P. S. C. Co.,
1009 James St.,
N. S., Pittsburgh, Pa.

Laurent, George F.,
Ass't. Sup't.,
Ft. Pitt Mall. Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Laurent, Jos. A.,
Fore. Shipping Dept.,
Fort Pitt Mall. Iron Co.,
1111 Church Ave.,
McKees Rocks, Pa.

Lawler, Joseph A.,
Ass't. Sup't. Trans.,
Carnegie Steel Co.,
208 Hawkins Ave.,
Braddock, Pa.

Lawson, A. F.,
Foreman Painter,
P. & L. E. R. R.,
Box 91,
Groveton, Pa.

Lawson, Chas.,
Supt. Mech. Dept.,
So. African Rwy.,
Railway Hdq. Building,
Johannesburg, So. Africa.

Laylin, M. H.,
Road Foreman Engines,
W. & L. E. R. R.,
2414 S. Erie St.,
Massillon, Ohio

Leach, C. C.,
Fore. Car Insp'rs.,
Penna. System,
408 Grant St.,
South Fork, Pa.

Lee, L. A.,
Supt. Teleg., P. & L. E. R.R.,
64 Terminal Annex Bldg.,
Pittsburgh, Pa.

Leet, C. S.,
Land Agent,
B. & L. E. R. R.,
Union Arcade,
Pittsburgh, Pa.

Lehr, Harry W.,
Genl. Fore. Pass's. Car Insp.,
P. R. R. Co.,
6832 McPherson Blvd.,
Pittsburgh, Pa.

Lenhart, L. A.,
V. P. & Gen. Manager,
Youngstown Steel Car Co.,
Niles, Ohio

Lent, John F.,
Traffic Counsel,
906 Cham. of Com. Bldg.,
Pittsburgh, Pa.

Leonard, D. E.,
Supt. Motive Power
Midland Valley R. R.,
Muskogee, Okla.

Lewis, Herbert,
U. S. Govt. Insp'r., I. C. C.,
100 Bowman Bldg.,
Pittsburgh, Pa.

Lewis, Malcolm F.,
Asst. C. C., Penna. System,
818 Laschall St.,
Pittsburgh, Pa.

Libengood, E. H.,
Gang. Fore., Penna. System,
2311 Strachan St.,
Dormont, Pitts., Pa.

Lichtenfels, Philip H.,
Foreman, Penna. System,
414 Third St.,
Pitcairn, Pa.

Lightell, S. M.,
Asst. Boiler Fore., Penna.
System,
11 Center Ave.,
Ingram, Crafton Sta., Pa.

Lilley, C. S.,
Cashier, Penna. System,
111 Maple Ave.,
Edgewood, Pitts., Pa.

Lindahl, A. M.,
A. Y. M., Union R. R.,
1320 Laketon Road,
Wilkinsburg, Pa.

Lindsay, Rev. S. McC.,
55 Hauscom Place,
Brooklyn, N. Y.

Lingle, S. E.,
Gang Fore., Penna. System,
926 Lincoln Ave.,
Pittsburgh, Pa.

Livingston, Edmund M.,
Production Checker,
Penna. System,
Pitcairn, Pa.

Lobez, P. L.,
Desinging Engr.,
Westinghouse Air Brake Co.,
418 Swissvale Ave.,
Wilkinsburg, Pa.

Lockwood, B. D.,
Consulting Engr.,
Standard Tank Car Co.,
311 Ormond St.,
Sharon, Pa.

Logan, Francis M.,
Chf. Smoke Ins'p.,
Penna. System,
4815 Liberty Ave.,
Pittsburgh, Pa

Lohr, Allen W.,
Commercial Engr.,
W. A. B. Co.,
Tonnaleuka Club,
Wilmerding, Pa.

Long, Chas. R., Jr.,
Prest., Chas. R. Long & Co.,
622-630 East Main St.,
Louisville, Ky.

Long, Edward,
A. R. F. of E., P. R. R. Co.,
1017 Howard Ave.,
Altoona, Pa.

Long, H. P.,
Assistant Car Foreman,
B. & O. R. R. Co.,
217 N. Elizabeth St.,
Hazelwood, Pittsburgh, Pa.

Long, R. M.,
Air Brake Inspector and
Instructor,
P. & L. E. R. R.,
McKees Rocks, Pa.

Loughner, E. G.,
Pitts. Dist. Sales Mgr.,
Carbo-Oxygen Co.,
708 Swissvale Ave.,
Wilkinsburg, Pa.

Loshbough, L. C.,
Mech. Eng'r.,
Ft. Pitt Steel Casting Co.,
McKeesport, Pa.

Loutsenhizer, W. F.,
Work Distb'r.,
Penna. System,
624 Sixth St.,
Pitcairn, Pa.

Love, J. A.,
Cond'r., P. & W. Va. Ry.,
331 Rawland Ave.,
Carnegie, Pa.

Lowe, W. D.,
Civil Engineer.
2121 Federal St. Ext.,
N. S., Pittsburgh, Pa.

Lower, N. M.,
Assistant Gen. Mgr.,
Loco. Stoker Co.,
Robinson and Darrah Sts.,
N. S., Pittsburgh, Pa.

Lucy, E. E.,
Chief Mech. Engr.,
N. S. W. Gov't. Ry.,
Sydney, Australia

Ludgate, B. A.,
Assistant Engineer,
P. & L. E. R. R.,
Pittsburgh, Pa.

Ludwig, C. F.,
Machinist, Penna. System,
Box 223,
Pitcairn, Pa.

Lustenberger, L. C.,
Asst. to Asst. Gen'l. Mgr.
Sales, Carnegie Steel Co.,
314 Carnegie Bldg.,
Pittsburgh, Pa.

Lynch, C. A.,
Sales Rep., Fort Pitt
Steel Casting Co.,
McKeesport, Pa.

Lynch, E. K.,
Special R. R. Rep.,
Chicago Pneum. Tool Co.,
6 East 44th St.,
New York City.

Lynn, Sam'l,
Master Car Builder,
P. & L. E. R. R.,
McKees Rocks, Pa.

Lynn, Wm., Jr.,
Gen. Foreman Car Dept.,
P. & L. E. R. R.,
Box 161, R. D. 3,
Coraopolis, Pa.

Lytle, H. I.,
Clerk, P. C. & Y. Ry.,
507 Woodward St.,
McKees Rocks, Pa.

Mackert, A. A.,
Engr. of Insp'n.,
W. A. B. Co.,
450 Caldwell Ave.,
Wilmerding, Pa.

Magill, W. E.,
D. F. A.,
B. & O. R. R.,
510 Dawson Ave.,
Bellevue, Pa.

Malcolm, Elmer E.,
Engineman, Penna. System
Box 403 ,
Freeport, Pa.

Maliphant, C. W.,
Test Dept.,
W. A. B. Co.,
101 Herman Ave.,
Wilmerding, Pa.

Manning, R. E.,
Manager,
Cleveland Pneu. Tool Co.,
922 Farmers Bk. Bldg.,
Pittsburgh, Pa.

Manogue, W. T.,
Sales Engineer,
Sunbeam Elec. Mfg. Co.,
5257 No. Sixth St.,
Philadelphia, Pa.

Marsh, Wm. J.,
119 Noblestown Road,
Carnegie, Pa.

Marshall, L. L.,
Gen. Supt.,
Lake Erie, Franklin &
Clarion R. R.,
Clarion, Pa.

Marshall, Paul Emerson,
Loco. Insp'r., Montour R. R.,
919 Fifth Ave.,
Coraopolis, Pa.

Marshall, W. T.,
Acc'nt. & Valuation Engr.,
719 Ferree St.,
Coraopolis, Pa.

Martin, M. G.,
Instrumentman,
P. & W. Va. Ry.,
440 Wabash Bldg.,
Pittsburgh, Pa.

Martin, T. J.,
Asst. R. F. of E.,
Monon Div., P. R. R.,
Box 74,
West Brownsville, Pa.

Martin, W. H.,
Asst. Fore., Penna. System,
Box 114,
Pitcairn, Pa.

Marton, Richard A.,
Asst. E. H. Fore.,
Penna. System,
4080 Cabinet St.,
Pittsburgh, Pa.

Mason, Stephen C.,
Secretary, The
McConway & Torley Co.,
Arsenal Station,
Pittsburgh, Pa.

Masterann, Jos.,
Cond'r., Penna. System,
Box 149, Hazzard, Pa.

Matchett, H. K.,
Asst. Cash Clerk, Penna.Lines,
238 Grant Ave.,
Bellevue, Pa.

Maurer, O. J.,
Designer, W. E. & M. Co.,
606 Mill St.,
Wilkinsburg, Pa.

Maxfield, H. H.,
S. M. P., Southern Div.,
Penna. System,
402 Pennsylvania Bldg.,
Wilmington, Del.

Meade, Jess R.,
Asst. Sup'vr.A. B.,
P. & L. E. R. R.,
1100 Morrison Ave.,
N. S., Pittsburgh, Pa.

Meckert, Fred A.,
Gen. Mgr., Ft. Pitt
Spring and Mfg. Co.,
P. O. Box 917,
Pittsburgh, Pa.

Meeker, Harry B.,
Fore. Elec's., P. R. R.,
Verona Shops,
441 Parker St.,
Verona, Pa.

Mellon, W. B.,
E. H. Fore., P. R. R. Co.,
Manor, Pa.

Merscher, John,
Foreman Car Repairs,
P. & L. E. R. R.,
348 Woodward Ave.,
McKees Rocks, Pa.

Mertz, Jacob J.,
Gang Foreman Car Dept.,
P. & L. E. R. R.,
Glenwillard, Pa.

Meschter, Dr. E. F.,
Med. Exam'r.,
Penna. System,
401 N. Euclid Ave.,
Pittsburgh, Pa.

Meyers, John M.,
5169 Liberty Ave.,
Pittsburgh, Pa.

Miessner, Victor H.,
Metallurgist,
Pgh. Mall. Iron Co.,
34th and Smallman Sts.,
Pittsburgh, Pa.

Millar, Clarence W.,
Mgr. Order Dept.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Miller, J. F.,
Train Master, B. & O. R. R.,
314 Lookout Ave.,
Butler, Pa.

Miller, James M.,
Serg. Police, Penna. System,
3213 War St.,
Pittsburgh, Pa.

Miller, John,
Gen. Car Fore., Montour
Railroad,
5127 Blair St.,
Hazelwood, Pa.

Miller, Louis A., Jr.,
Trav. Auditor,
W. E. & M. Co.,
7319 Race St.,
E. E., Pittsburgh, Pa.

Miller, R. E.,
Eng'r. of Tests & Insp'ns.,
W. A. Brake Co.,
Wilmerding, Pa.

Miller, S. W.,
R. H. Forc., Mon. Con. R. R.,
774 Hazelwood Ave.,
Pittsburgh, Pa.

Miller, Wm.,
Treasurer, Montour R. R.,
1109 Oliver Bldg.,
Pittsburgh, Pa.

Millken, C. C.,
Asst. Traffic Dispatcher,
Carnegie Steel Co.,
806 Carnegie Bldg.,
Pittsburgh, Pa.

Milliken, I. H.,
Rep., The McConway &
Torley Co.,
48th St. and A. V. Ry.,
Pittsburgh, Pa.

Milliken, Col. Jas.,
President, Pitts. Test. Lab.,
Seventh & Bedford Aves.,
Pittsburgh, Pa.

Milliken, John M.,
Chief Engr. Construction,
Gulf Refining Co.,
1261 Frick-Annex,
Pittsburgh, Pa.

Miner, W. H.,
Railway Supplies,
209 So. LaSalle St.,
Chicago, Ill.

Minick, Don C.,
430 Machen St.,
Toledo, Ohio.

Minnick, F. G.,
Asst. Gen. Mgr.,
P. & L. E. R. R.,
308 Lincoln Ave.,
Bellevue, Pa.

Miser, C. H.,
Cashier, P. C. & Y. Ry.,
323 Broadway,
McKees Rocks, Pa.

Mitchell, A. G.,
Secy. Assn. of Transpn. Officers,
Penna. System,
Broad Street Station,
Philadelphia, Pa.

Mitchell, Frank K.,
Signal Insp'r., P. & L. E. R.R.,
55 Terminal Annex Bldg.,
Pittsburgh, Pa.

Mitchell, J. Wallace,
Salesman,
Pitts. Forge & Iron Co.,
1306 C. of Commerce Bldg.
Pittsburgh, Pa.

Mitchell, John H.,
Standard Steel Car Co.,
Frick Bldg.,
Pittsburgh, Pa.

Mitchell, Thos. J.,
V. P. & Gen. Mgr.,
Standard Inspection Co.,
1617 Falck Ave.,
N. S., Pittsburgh, Pa.

Mode, H. C.,
Pres. & Gen. Mgr.,
Pgh. Battery Service Co.,
Center & Morewood Aves.,
Pittsburgh, Pa.

Moeller, John J.,
Gang Forc., Penna. System,
1440 Lowrie St.,
N. S., Pittsburgh, Pa.

Moeller, W. C.,
Agt., Amer. Rwy. Express Co.,
400 N. Mathilda St.,
E. E., Pittsburgh, Pa.

Moir, W. B.,
Gen. Car Inspr.,
Penna. System,
504 Penna. Station,
Pittsburgh, Pa.

Monks, J. J.,
A. G. F. A., N. Y. C. R. R.,
230 Fifth Ave.,
Pittsburgh, Pa.

Montague, W. T.,
Asst. Engr. M. P.,
Penna. System,
506 Penna. Station,
Pittsburgh, Pa.

Montgomery, J. L.,
C. C., Accounting Dept.,
Union R. R.,
1418 Carnegie Bldg.,
Pittsburgh, Pa.

Moore, Donald O.,
Traffic Manager,
Chamber of Commerce,
Pittsburgh, Pa.

Moore, Frank,
Pres't. Pgh. Malleable
Iron Co.,
1517 Farmers Bk. Bldg.,
Pittsburgh, Pa.

Moran, J. V.,
Storekeeper,
Monon. Ry. Co.,
242 Ninth Ave.,
West Homestead, Pa.

Moreland, Evan L.,
Mach. Shop. Fore.,
Montour R. R.,
1215 Hiland Ave.,
Coraopolis, Pa.

Morris, J. H.,
Fuel Sup'vr., B. R. & P. Ry.,
704 E. Mahoning St.,
Punxsutawney, Pa.

Morrow, H. C.,
Gang Fore., Penna. System,
783 Sixth St.,
Pitcairn, Pa.

Morrow, Robt. T.,
Supt. Pitts. Div.,
Penna. System,
314 Penna. Station,
Pittsburgh, Pa.

Morse, J. W.,
Asst. R. F. of E.,
Penna. System,
Freeport, Pa.

Morse, L. A.,
Master Painter, Pgh. Div.,
Penna. System,
422 Second St.,
Pitcairn, Pa.

Mowery, F. J.,
Clerk, Penna. System,
236 Hasting St.,
Pittsburgh, Pa.

Moyer, Oscar G. A.,
Fireman, Rieck-McJunkin
Dairy Co.
221 Moye St.,
Mt. Oliver, Pa.

Mullen, M.,
A. R. A. Billing Clerk,
Union R. R.,
East Pittsburgh, Pa.

Mullin, D. C.,
Asst. Storekeeper, P. R. R.,
6701 Thomas Blvd.,
Pittsburgh, Pa.

Murphy, E. S.,
Shop Acc't.,
P. & L. E. R. R.,
1518 Ridge Ave.,
Coraopolis, Pa.

Murphy, W. J.,
G. B. M. F., Penna. R. R.,
3614 Mexico St.,
N. S., Pittsburgh, Pa.

Murray, M. Y.,
C. C. to R. F. of E.,
Penna. System,
531 Penn St.,
Verona, Pa.

Myers, Walter H.,
Chief Clerk to M. M.,
Montour R. R. Co.,
174 Monroe St.,
Rochester, Pa.

McAbee, W. S.,
G. Y. M.,
Union R. R.,
5239 Gertrude St.,
Pittsburgh, Pa.

McAlpin, Samuel J.,
Foreman, P. S. C. Co.,
3586 Elmhurst St.,
N. S., Pittsburgh, Pa.

McAndrew, R.,
General Storekeeper,
B. & L. E. R. R.,
Greenville, Pa.

McAninch, D. A.,
Engr., B. & O. R. R.,
219 Elizabeth St.,
Pittsburgh, Pa.

McBroom, J. F.,
Fore. Car Insp'rs.,
Penna. System,
216 W. Fifth Ave.,
Derry, Pa.

McCandless, Geo. W.,
Treasurer, The
McConway & Torley Co.,
48th St. and A. V. Ry.,
Pittsburgh, Pa.

McCartney, J. L.,
Res. Sales Mgr.,
Niles Bement Pond Co.,
425 Seventh Ave.,
Pittsburgh, Pa.

McCaslin, A. W.,
Mechanical Inspector,
P. & L. E. R. R.,
307 Grace St.,
Mt. Washington,
Pittsburgh, Pa.

McCauley, Wm.,
R. F. of E. Penna. System,
28 Kerr St.,
Uniontown, Pa.

McClellan, Albert W.,
Div. Sup't., Penna. System,
77 West Main St.,
Uniontown, Pa.

McClintock, John D.,
Rep., Wm. Sellers&Co., Inc.,
1600 Hamilton St.,
Philadelphia, Pa.

McCloskey, J. C.,
Clerk, Union R. R. Co.,
East Pittsburgh, Pa.

McClumpha, H. E.,
Genl. Supt., National Car
Wheel Company,
Keystone Bldg.,
Pittsburgh, Pa.

McComb, R. J.,
Assistant to President,
The Q. & C. Co.,
1201 Peoples Gas Bldg.,
Chicago, Ill.

McConn, G. E.,
Clerk, Purchasing Dept.,
P. & L. E. R. R.,
222 P. & L. E. Station,
Pittsburgh, Pa.

McConnell, C. H.,
Elec. Eng'r.,
P. & L. E. R. R. Co.,
218 House Bldg.,
Pittsburgh, Pa.

McConnell, John J. P.,
Special Clk., Penna .System,
5206 Butler St.,
Pittsburgh, Pa.

McConnell, Peter .L.,
Eng'r., P. R. R. Co.,
179 Home St.,
Pittsburgh, Pa.

McConway, Wm., Jr.,
Vice President, The
McConway & Torley Co.,
48th St. and A. V. Ry.,
Pittsburgh, Pa.

McCormick, Louis P.,
Gang Fore., Penna. System,
7011 Idlewild St.,
Pittsburgh, Pa.

McCully, B. N.,
Fore. Car Repairs,
Penna. System,
465 Biddle Ave.,
Wilkinsburg, Pa.

McDermitt, E. E.,
Gang Fore., Penna. System,
633 N. Uhrich St.,
Uhrichsville, Ohio

McDermitt, W. W.,
C. C., Penna. System,
619 Kelly Ave.,
Wilkinsburg, Pa.

McDonald, L. S.,
Gang Fore., Penna. System,
P. O. Box 365,
East McKeesport, Pa.

McDowell, D. W.,
Chief Inspector,
Jones & Laughlin Steel Co.
203 Conniston Ave.,
Pittsburgh, Pa.

McElheny, M. L.,
Train Master,
B. & O. R. R. Co.,
Johnston Ave.,
Connellsville, Pa.

McFeatters, F. R.,
General Superintendent,
Union R. R. Co.,
East Pittsburgh, Pa.

McGaughey, John V.,
A. R. F. of E., P. R. R.,
441 Locust St.,
Johnstown, Pa.

McGowan, Chas. H.,
Draftsman, P. S. C. Co.,
123 S. Bryant St.,
Bellevue, Pa.

McGrann, E. Roy,
Asst. Supt., McK. Conn. R R.,
1727 Scott St.,
McKeesport, Pa.

McGregor, D. C.,
Supervisor Terminals,
B. & O. R. R.,
420 Mansion St.,
Hazelwood Station,
Pittsburgh, Pa.

McIntyre, Frank A.,
Y. M., P. & W. Va. Ry.,
30 Ridge Ave.,
Crafton, Pittsburgh. Pa.

McKee, D. L.,
Supv. Bridges & Bldgs.,
P. & L. E. R. R.,
McKees Rocks, Pa.

McKee, Frederick C.,
Pres., Winfield R. R.,
2215 Oliver Bldg.,
Pittsburgh, Pa.

McKee, S. Frank,
Asst. to Gen. Mgr.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

McKenzie, C. L.,
Pres't. Pgh. Construct'n. Co.,
808 Diamond Bank Bldg.,
Pittsburgh, Pa.

McKinley, Andrew,
Asst. Fore., Mach. Shop,
Penna. System,
546 North Ave.,
Verona, Pa.

McKinstry, C. H.,
Foreman, W. A. B. Co.,
46 Sprague St.,
Wilmerding, Pa.

McKirahan, J. R.,
C. C. to T. M., P. & W. Va.
Railway
5527 Hays St.,
E. E., Pittsburgh. Pa.

McLain, J. E.,
Sales Agent,
Bethlehem Steel Co.,
1807 Oliver Bldg.,
Pittsburgh, Pa.

McMahon, H. R.,
President,
Standard Steel Spring Co.,
843 Fourth St.,
Coraopolis, Pa.

McMullen, Clark E.,
Trav. Car Agent,
P. & L. E. R. R. Co.,
Maple St. Extension,
Coraopolis, Pa.

McMurray, Clifford H.,
Gang Fore., Penna. System,
121 Cleveland Ave.,
Bellevue, Pa.

McNamara, John V.,
Smoke Inspector,
P. & L. E. R. R.,
3357 Carson St.,
Corliss Sta.
Pittsburgh, Pa.

McNamee, W. L.,
Lead Clerk, Penna. System,
1820 Sidney St.,
Pittsburgh, Pa.

McNeill, J. Edward,
Asst. Chief Lineman,
Penna. System,
304 Fisk Ave.,
Avalon, Pa.

McNicholl, Chas.,
Div. Frt. Agt., American
Bridge Co.,
1462 Frick Annex Bldg.,
Pittsburgh, Pa.

McNulty, F. M.,
107 Edge Cliff Road,
Rosslyn Farms,
Carnegie, Pa.

McVicar, G. E.,
Service Engr.,
Galena Signal Oil Co.,
Franklin, Pa.

Nall, R. M.,
Asst. Prin. Engr.,
P. & W. Va. Ry.,
439 Wabash Bldg.,
Pittsburgh, Pa.

Neal, J. T.,
Special Engineman, P. R. R.,
7216 Monticello St.,
Pittsburgh, Pa.

Neff, John P.,
Vice President,
American Arch Co.,
17 E 42nd St.,
New York, N. Y.

Neff, L. M.,
E. H., Fore., P. R. R.,
1320 Wood St.,
Wilkinsburg, Pa.

Nelan, E. J.,
Car Dept. Clerk,
Monon. R. R.,
Brownsville, Pa.

Nelson, W. O.,
Ass't. Div. Eng'r.,
B. & O. R. R. Co.,
B. & O. Station,
Pittsburgh, Pa.

Neville, Joseph,
Asst. Engr. Corps,
Penna. System,
1013 Penn Ave., Room 601,
Pittsburgh, Pa.

Newell, E. W.,
Mech'l. Eng'r., W. A. B. Co.,
Wilmerding, Pa.

Newlin, C. E.,
Engineer, U. R. R.,
314 Mifflin St.,
Wilkinsburg, Pa.

Newman, John F.,
Storekeeper, Penna. System,
6555 Shetland Ave.,
Pittsburgh, Pa.

Nicodemus, Earle H.,
Material Agt.,
P. R. R. Co.,
102 Penna. Station,
Pittsburgh, Pa.

Nieman, H. L.,
Gang Foreman,
P. & L. E. R. R.,
208 Copeland St.,
McKees Rocks, Pa.

Niland, John J.,
Gang Fore., P. R. R. Co.,
West Brownsville, Pa.

Noah, Wm. J.,
Gang Fore., Penna. System,
7321 Church Ave.,
Bellevue, Pa.

Noble, Jesse A.,
Gen. Fore. Carpenters,
P. & L. E. R. R.,
Box 535,
McKees Rocks, Pa.

Noonan, W. C.,
Car Acc't., P. & W. Va. Ry.,
926 Wabash Bldg.,
Pittsburgh, Pa.

Norris, J. L.,
R. F., B. & O. R. R.,
4818 Chatsworth St.,
Pittsburgh, Pa.

North, D. P.,
Fore. Car Insp'rs.,
Penna. System.
1173 Milfred St.,
Johnstown, Pa.

Nutt, Col. H. C.,
Pres. & Gen. Mgr.,
Monongahela Rwy. Co.,
Century Bldg.,
Pittsburgh, Pa.

Oakley, Philip A.,
Gang Fore., Penna. System,
748 Napoleon St.,
Johnstown, Pa.

Obermeir, Henry,
Foreman, Penna. System,
926 Brinton Ave.,
Pitcairn, Pa.

O'Brien, Martin J.,
Pres., Martin J. O'Brien Co.,
803 Union Bank Bldg.,
Pittsburgh, Pa.

O'Donnell, W. P.,
Gang Fore., Penna. System,
514 Second Ave.,
Derry, Pa.

Ogden, F. A.,
General Freight Agent,
Jones & Laughlin Stl. Co.,
Pittsburgh, Pa.

Ogden, Geo. D.,
Traffic Mgr.,
Penna. System,
Pittsburgh, Pa.

O'Leary, Jeremiah J.,
Gang Fore., Penna. System,
132 Fourth St.,
Oakmont, Pa.

Orbin, Geo. N.,
Engineman, B. & O. R. R.,
2945 Glenmore Ave.,
Pittsburgh, Pa.

Orchard, Chas.,
Traffic Dept., Carnegie
Steel Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

O'Rourke, Wm. J.,
Gen. Clerk, Transp. Dept.,
P. & L. E. R. R.,
Pittsburgh, Pa.

Orr, W. M.,
2404 Firts Nat. Bank Bldg.,
Pittsburgh, Pa.

Osborne, L. E.,
Mech. Eng'r.,
Loco. Stoker Co.,
Robinson & Darrah Sts.,
N. S., Pittsburgh, Pa.

Osbourne, Alfred S.,
Pres. Universal Pack. Corp.,
342 Second Ave.,
Pittsburgh, Pa.

Osterrieder, A. J.,
Asst. Fore. Boiler Shop,
P. & L. E. R. R.,
1209 Holmes St.,
McKees Rocks, Pa.

O'Toole, J. L.,
Supt. Frt. Transp'n.,
P. &. L. E. R. R.,
612 Terminal Bldg.,
Pittsburgh, Pa.

Oyen, E.,
Chief Engr.,
Mich. Elevated Rwy. Co.,
1319 Kensington Ave.,
Youngstown, Ohio.

Padfield, Archie,
Chief Draftsman,
P. R. R. Co.,
538 Penn St.,
Verona, Pa.

Painter, E. W.,
Yard Clerk, Union R. R.,
108 8th St.,
Turtle Creek, Pa.

Painter, Jos.,
R. R. Eq.,
5226 Baum Blvd.,
Pittsburgh, Pa.

Paisley, R. M..
Gen. Frt. Agt.,
P. & W. Va. Ry.,
Wabash Bldg.,
Pittsburgh, Pa.

Parke, F. H.,
Gen'l. Engr., W. A. B. Co.,
Wilmerding, Pa.

Parker, W. G.,
Machinist, P. & L. E. R. R.,
3021 Merwyn Ave.,
Corliss Sta., Pittsburgh, Pa.

Partington, Joshua A.,
Rep., American Arch Co.,
225 Cornell Ave.,
Bellevue Branch,
Pittsburgh, Pa.

Parry, W. I.,
Spl. Salesman,
Carnegie Steel Co.,
Carnegie Building,
Pittsburgh, Pa.

Passino, F. J.,
Mgr., Pgh. Dist.,
Inde. Pneu. Tool Co.,
718 Bessemer Bldg.,
Pittsburgh, Pa.

Passmore, H. E.,
Salesman, Grip Nut Co.,
1821 Bryden Road,
Columbus, Ohio.

Patmor, H. F.,
M. C. B., P. & W. Va. Ry,,
1510 Shady Ave.,
Pittsburgh, Pa.

Patrios, August,
Gang Fore., Penna. System,
7147 Kedron St.,
Pittsburgh, Pa.

Patterson, J. E.,
Loco. Engr., U. R. R.,
7236 McClure Ave.,
Swissvale, Pa.

Patterson, R. F.,
Plant Engr., Keystone
Driller Co.,
1226 Sixth Ave.,
Beaver Falls, Pa.

Paugh, Percy,
Gen'l. Fore.,
Monongahela R. R.,
So. Brownsville, Pa.

Peabody, G. E.,
T. C. I., B. & L. E. R. R.,
38 Columbia Ave.,
Greenville, Pa.

Peacock, W. W.,
Rep., Niles-Bement-Pond Co.,
Pratt & Whitney Co.,
425 Seventh Ave.,
Pittsburgh, Pa.

Peffer, J. C.,
Ass't. Gen'l. Foreman,
Penna. R. R. Co.,
1221 Boyle St.,
N. S., Pittsburgh, Pa.

Pehrson, A. K.,
Mech. Engr.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Penton, John A.,
President, The Penton Pub.
Co.,
Cleveland, O.

Peoples, Jas. S.,
Asst. T. M., P. R. R. Co.,
Manor, Pa.

Perkins, Chas. F.,
General Manager,
Davis Brake Beam Co.,
Box 982,
Johnstown, Pa.

Perrott, J. C.,
Asst. Supt., Labor &
Wage Bureau,
Penna. System,
Pittsburgh, Pa.

Perry, Geo. M.,
C. C., Transp. Dept.,
P. & L. E. R. R.,
Pittsburgh, Pa.

Perry, W. E.,
Transportation Acc't.,
Penna. Lines West,
Room 1009, Penna. Sta.,
Pittsburgh, Pa.

Pfarr, Jacob,
Fore., Penna. System,
7317 Hamilton Ave.,
Pittsburgh, Pa.

Pfeil, John M.,
Sales Engineer,
Westinghouse Electric &
Manufacturing Co.,
Union Bank Bldg.,
Pittsburgh, Pa.

Phillips, Wm. H.,
Engineman, Penna. System.,
528 S. Winebiddle Ave.,
Pittsburgh, Pa.

Pierce, H. B.,
Asst. Supt.,
Monongahela Ry.,
Brownsville, Pa.

Platt, J. G.,
Vice President & Sales Mgr.,
Hunt-Spiller Mfg. Corp.,
383 Dorchester Ave.,
So. Boston, 27, Mass.

Porter, H. T.,
Chief Engineer,
B. & L. E. R. R. Co.,
Greenville, Pa.

Post, Geo. A.,
Pres., Geo. A. Post Co., Inc.,
136 Liberty St.,
New York, N. Y.

Post, W. M.,
Supt. Teleegraph & Signals,
P. R. R.,
933 Fulton Bldg.,
Pittsburgh, Pa.

Postlethwaite, C. E.,
Gen'l. Sales Manager,
Pressed Steel Car Co.,
55 Broad St.,
New York, N. Y.

Pratt, I. D.,
Asst. Gen. Fore., P. R. R.,
735 Midland St.,
Wilkinsburg, Pa.

Price, G. W.,
Asst. Fore. Tin Shop,
Penna. System,
403 Center Ave.,
Pitcairn, Pa.

Price, W. F.,
Clerk,
Union R. R. Co.,
128 Shaw Ave.,
Turtle Creek, Pa.

Proft, J. W.,
Clerk, Union R. R.,
5734 Melvin St.,
E. E., Pittsburgh, Pa.

Prouty, Eugene,
District Engineer,
Loco. Stoker Co.,
30 General Robinson St.,
N. S., Pittsburgh, Pa.

Provost, S. W.,
C. C., American Loco. Co.,
2101 Beaver Ave.,
N. S., Pittsburgh, Pa.

Quest, W. O.,
Ball Chemical Co.,
136 Charles St.,
Mt. Oliver Sta.,
Pittsburgh, Pa.

Quinn, John M.,
Work Distributor,
Penna. System,
1242 Illinois Ave.,
Pittsburgh, Pa.

Rabold, W. E.,
Motive Power Clerk,
P. R. R. Co.,
366 Lehigh Ave.,
E. E., Pittsburgh, Pa.

Ralph, Wm. E.,
Car Insp'r., P & L. E. R. R.,
1003 State Ave.,
Coraopolis, Pa.

Ralston, John A.,
Mech. Engr., U. R. R. Co.,
556 Frick Annex,
Pittsburgh, Pa.

Ramsey, R. S.,
Inspecting Engr.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Rank, G. G.,
Del. Clk. Purch. Dept.,
Penna. System,
14 Walnut St.,
Crafton, Pitts., Pa.

Rankin, B. B.,
Asst. Auditor,
P. & L. E. R. R.,
1502 Fairlawn Ave.,
Dormont,
Pittsburgh, Pa.

Raser, Geo. B.,
Sales Engr.,
Ingersoll-Rand Co.,
706 Chamber of Com. Bldg.,
Pittsburgh, Pa.

Rauch, T. T.,
506 Brownsville Road,
Mt. Oliver Sta.,
Pittsburgh, Pa

Rauschart, E. A.,
Mech. Supt., Montour R. R.,
Coraopolis, Pa.

Read, Sylvester C.,
Asst. M. M., P. R. R. Co.,
Verona, Pa.

Ream, A. H.,
S. M. P. & E.,
P. & S. R. R.,
Brookville, Pa.

Redding, D. J.,
Supt. Motive Poweer,
P. & L. E. R. R. Co.,
Pittsburgh, Pa.

Redding, P. E.,
Salesman,
Johns-Manville, Inc.,
Cleveland, Ohio.

Redding, R. D.,
Asst. Gen. E. H. Fore.,
P. & L. E. R. R. Co.,
330 Russelwood Ave.,
McKees Rocks, Pa.

Redman, J. Thos.,
Asst. Car Fore., Union R. R.,
99 Hazelwood Ave.,
Pittsburgh, Pa.

Reed, F. W.,
Asst. Fore., Penna. System,
302 Edgewood Ave.,
Trafford, Pa.

Reeve, George,
Fore. Electrical Dept.,
Ft. Pitt Malleable Iron Co.,
P. O. Box 1054,
Pittsburgh, Pa.

Regan, W. J.,
Mechanical Engineer,
The McConway-Torley Co.
48th St. & A. V. Ry.,
Pittsburgh, Pa.

Reich, F. C.,
Superintendent,
P. A. & McK. R. R. Co.,
McKees Rocks, Pa.

Renshaw, W. B.,
Commercial Engr'g Dept.,
W. A. B. Co.,
Wilmerding, Pa.

Reynolds, D. E.,
C. C., B. & L. E. R. R.,
687 Union Arcade,
Pittsburgh, Pa.

Reynolds, Frank H.,
Rep. American Loco. Co.,
30 Church St.,
New York City.

Rhoads, G. A.,
Ass't. M. M.,
Penna. System,
340 College Ave.,
Beaver, Pa

Rhodes, David W.,
Asst. E. H. Fore., P. R. R.,
7908 Susquehanna St.,
Wilkinsburg, Pa.

Rhodes, G. P.,
Treasurer,
National Car Wheel Co.,
1305 Keystone Bldg.,
Pittsburgh, Pa.

Rhodes, Jas. D.,
President,
National Car Wheel Co.,
1305 Keystone Bldg.,
Pittsburgh, Pa.

Rhodes, Wm. H.,
Cash Clk., Treas. Dept.,
Penna. System,
325 Dalzell Ave.,
Ben Avon, Pa.

Rice, D. S.,
Foreman Boiler Shop,
Penna. R. R. Co.,
28th St. Shops,
Pittsburgh, Pa.

Richardson, H. R.,
Sup't. of Wage Schedules,
P. & L. E. R. R.,
Pittsburgh, Pa.

Rick, Robert C.,
E. H. Fore., Penna. System,
1237 Lancaster Ave.,
Swissvale, Pa.

Riddile, F. C.,
General Manager,
Edgewater Steel Co.,
P. O. Box 249,
Pittsburgh, Pa.

Riley, Geo. N.,
Nat'l. Tube Co.,
Frick Building,
Pittsburgh, Pa.

Riley, Raymond S.,
Clerk, Penna. System,
228 45th St.,
Pittsburgh, Pa.

Ritts, Wm. H.,
Steam Engineer,
Spang, Chalfant & Co.,
1 Pine St.,
Sharpsburg, Pa.

Robbins, Frank S.,
Rwy. Rep., Pitts. Testing Lab.,
7th & Bedford Aves.,
Pittsburgh, Pa.

Robinson, R. L.,
C. C. to Purch. Agt.,
P. & W. Va. Ry.,
403 Wabash Bldg.,
Pittsburgh, Pa.

Rock, David E.,
Mat'l. Agt., Penna. System,
510 Elliott St.,
Wilkinsburg, Pa.

Rodgers, Robert,
Sales Agt., American Car
& Fdry. Co.,
Farmers Bank Bldg.,
Pittsburg, Pa.

Rogan, John A.,
M. M., Div. No. 1,
Pgh. Railways Co.,
Homewood Office,
Pittsburgh, Pa.

Rogers, W. R.,
Chief Joint Insp't.,
P. & L. E. R. R.,
Youngstown, Ohio.

Roney, H. E.,
Sig. Draftsman,
P. & L. E. R. R.,
1116 Fifth Ave.,
Beaver Falls, Pa.

Root, E. E.,
Treas. & Gen. Mgr.,
Gibraltar Lubricating Co.,
1707 1st Nat. Bank Bldg.,
Pittsburgh, Pa.

Rose, A. J.,
Superintendent,
Greenville Steel Car Co.,
74 Harrison St.,
Greenville, Pa.

Rosenstock, J. H.,
Master Trans.,
General Electric Co.,
84 Office Bldg.,
Schenectady, N. Y.

Roth, Philipp J.,
P. W. Car Insp'r.,
P. & L. E. R. R.,
312 Anthony St.,
Mt. Oliver Sta.,
Pittsburgh, Pa.

Rowe, J. L.,
Asst. Mgr. R. R. Sales,
Chicago Pneu. Tool Co.,
6 East 44th St.,
New York City.

Ruben, J. W.,
Dist. Agent, Pacific
Fruit Express Co.,
219 Rwy. Exchange Bldg.,
Kansas City, Mo.

Rudd, W. B.,
Asst. Engr. M. P.,
Penna. System,
520 Penna. Station,
Pittsburgh, Pa.

Rumbarger, F. A.,
Mgr., Gen'l Equipment Co.,
2335 Oliver Bldg.,
Pittsburgh, Pa.

Russell, C. T.,
C. C., Engr. M. of W.,
P. & L. E. R. R.,
Pittsburgh, Pa.

Ryan, D. W.,
Order Clerk,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Ryder, Gilbert E.,
Vice President,
The Superheater Co.,
17 East 42nd St.,
New York City

Rys, C. F. W.,
Met. Engineer,
Carnegie Steel Co.,
517 Carnegie Bldg.,
Pittsburgh, Pa.

Sage, Ralph V.,
Rep. Cambria Steel Co.,
Widener Bldg.,
Philadelphia, Pa.

St. Clair, Chas. B.,
Gang Fore., Penna. System,
534 Lake St.,
South Fork, Pa.

Salisbury, William,
Trav. Car Insp'r.,
P. & L. E. R. R.,
Box 175,
Newell, Pa.

Saltic, Thos.,
Fore. Melting Dept.,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Salzman, Robert,
Gang Fore., Penna. System,
401 Pinney St.,
Rochester, Pa.

Sandman, A. G.,
Mechanical Engineer,
B. & O. R. R.,
Mt. Clare Shops,
Baltimore, Md.

Santell, Ralph F.,
Trainman, P. & L. E. R. R.,
1048 Morgan Ave.,
Monessen, Pa.

Sattley, E. C.,
Vice Pres.,
The Champion Sales Co.,
609 Chamber of Commerce Bldg.,
Pittsburgh, Pa.

Schaaf, A. J.,
Supt. Marine Ways,
Pittsburgh Steel Co.,
142 Merrimac St.,
Mt. Washington,
Pittsburgh, Pa.

Schaefer, Frederic,
614 Oliver Bldg.,
Pittsburgh, Pa.

Schaeffer, F. E.,
Asst. Manager of Sales,
Union Spring & Mfg. Co.,
300 Granite Bldg.,
Pittsburgh, Pa.

Scheck, H. G.,
Retired, Penna. System,
406 Zara St.,
Mt. Oliver, Pitts., Pa.

Schiller, John
Cond'r., P. & W. Va. R. R.,
Care J. J. Quinn,
Branch No. 8,
Crafton, Pitts., Pa.

Schmoll, G. A.,
Sup'er. Loco. Maintenance,
B. & O. R. R.,
Baltimore, Md.

Schoen, W. H., Jr.,
Vice President,
Pgh. Knife & Forge Co.,
608 Farmers Bank Bldg.,
Pittsburgh, Pa.

Schrecongost, C. P.,
Traffic Mgr.,
Hillman Coal & Coke Co.,
2101 First Nat. Bank Bldg.,
Pittsburgh, Pa.

Schuchman, W. R.,
President,
Homestead Valve Mfg. Co.
Homestead, Pa.

Schwab, Charles,
Clerk, Purch. Dept.,
Penna. System,
1013 Penn Ave., Room 301,
Pittsburgh, Pa.

Searles, E. J.,
Schaefer Equipment Co.,
Oliver Bldg.,
Pittsburgh, Pa.

See, Theo. S.,
Pres., Damascus Tool Co.,
2224 St. Lukes Square,
N. S., Pittsburgh, Pa.

Seibert, Wm. L.,
Asst. E. H. Fore.,
P. & L. E. R. R.,
327 Russellwood Ave.,
McKees Rocks, Pa.

Seiss, W. C.,
Foreman Car Insp'rs.,
P. C. C. & St. L. Ry. Co.,
2786 Zephyr Ave.,
Corliss Station,
Pittsburgh, Pa.

Seley, C. A.,
Consulting Engr.,
Loco. Firebox Co.,
630 Marquette Bldg.,
Chicago, Ill.

Severn, A. B.,
Sales Engineer,
A. Stucki Co.,
419 Oliver Bldg.,
Pittsburgh, Pa.

Sewell, H. B.,
R. R. Rep.,
Johns-Manville, Inc.,
Westinghouse Bldg.,
Pittsburgh, Pa.

Shaffer, Glenn A.,
Record Clk. P. & L. E. R. R.,
2611 Wilson Ave.,
E. Youngstown, Ohio

Shannon, David E.,
Welfare & Employment Agt.,
Ft. Pitt Malleable Iron Co.
P. O. Box 1054,
Pittsburgh, Pa.

Shaw, George M.,
Representative,
Standard Steel Car Co.,
1517 Continental Bldg.,
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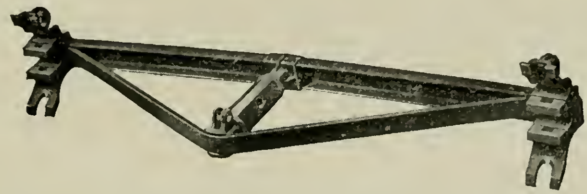

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